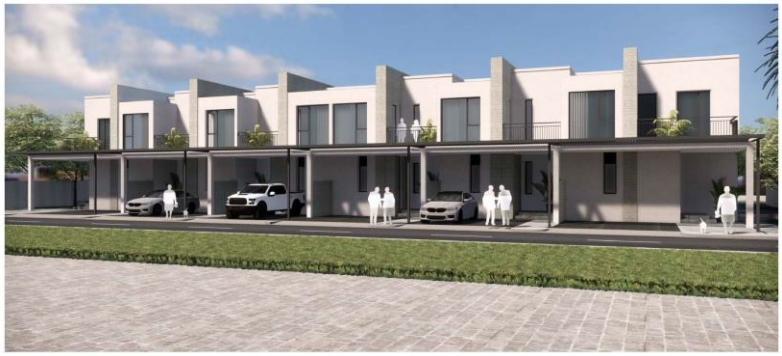
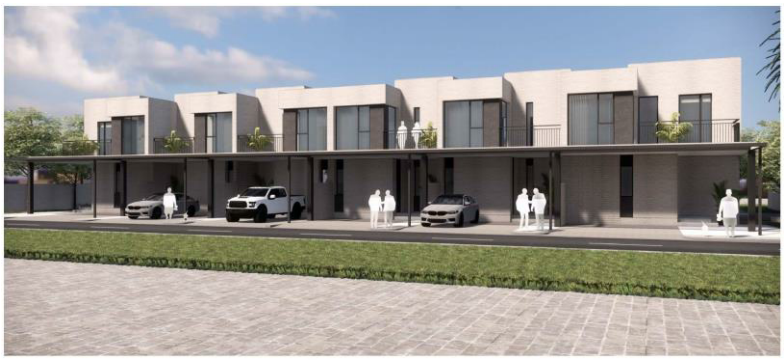
EMAAR SOUTH DEVELOPMENT - PLOT GC04 PARKSIDE 2
DUBAI - U.A.E.

EMPLOYER:

EMAAR PROPERTIES PJSC
P.O. Box 9440, DUBAI – U.A.E





TENDER AND CONTRACT DOCUMENTS
MAIN WORKS CONTRACT

VOLUME 5 - PART 6

DUBAI MUNICIPALITY GREEN BUILDINGS REQUIREMENTS COMPLIANCE GUIDELINES

APRIL 2019

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Emaar South Development Plot GC04 Parkside2
DUBAI - U.A.E.

MAIN WORKS CONTRACT

DUBAI MUNICIPALITY GREEN BUILDINGS REQUIREMENTS COMPLIANCE GUIDELINES

CONTENTS

SECTION 01 6100
PROJECT SUSTAINABILITY GUIDELINES

PART 1 - GENERAL

1.1 SUMMARY

A. Emaar South Development Plot GC04 Parkside2 project is designed to conform to Dubai Municipality Green Buildings Regulations (DMGBR). The project's materials and systems are selected to comply with the requirements stipulated in these regulations, especially the performance criteria under both the Material and buildings Vitality categories that address construction waste management, elimination of hazardous materials & the use of low VOC materials as prescribed by the system's credits. Therefore, the Contractor is required to take into consideration and show successful compliance with Dubai Municipality Green Buildings Regulations (DMGBR); to ensure the environmental quality performance of the Project Development. The Contractor should describe the methodology he intends to adopt to secure compliance with Dubai Municipality Green Buildings Regulations (DMGBR) requirements. The methodology will be subject to review and appraisal by Authorities / Engineer against Dubai Municipality Green Buildings Regulations (DMGBR) requirements. The Contractor's works can commence only after full compliance with Dubai Municipality Green Buildings Regulations (DMGBR) requirements is ensured. The contractor is required to take into consideration and show successful compliance with Dubai Municipality Green Buildings Regulations (DMGBR) requirements as specified herein and the other sections of specifications to ensure the sustainable quality of the project development.

B. The Contractor is responsible for the procurement of appropriate materials and products that comply with Dubai Municipality Green Buildings Regulations (DMGBR) criteria as described within the specifications. The various specifications identify characteristics and as part of the procurement process the Contractor shall confirm through their Sustainability Construction engineer, that Dubai Municipality Green Buildings Regulations (DMGBR) attributes have been recognized and achieved prior to confirming any purchase orders.

C. The Contractor understands and acknowledges that Dubai Municipality Green Buildings Regulations (DMGBR) compliant materials and products may limit the sourcing opportunities normally available. Any premium for Dubai Municipality Green Buildings Regulations (DMGBR) compliant materials is already contained within the Contractor's cost and scheduling program.

D. Contractor to assign Sustainability Manager/consultant to work with the Employer's Sustainability Consultant. The Contractor's sustainability manager/consultant shall be able to understand the tasks, have the authority to plan processes and authority to allocate resources as required to complete the various tasks throughout the duration of the Works.

1.2 OBJECTIVES

A. The Contractor during the construction phase of this project shall implement the following procedures singly or in combination:

1. Select products that minimize consumption of non-renewable resources consume reduced amounts of energy and minimize amounts of pollution to produce, and employ recycled and/or recyclable materials. To help purchasers incorporate environmental considerations into purchasing decisions, it is the intent of this project to conform to EPA's Five Guiding Principles on environmentally preferable purchasing. The five principles are:

   a. Include environmental considerations as part of the normal purchasing process.
   b. Emphasize pollution prevention early in the purchasing process.
   c. Examine multiple environmental attributes throughout a product's or service's life cycle.
   d. Compare relevant environmental impacts when selecting products and services.
   e. Collect and base purchasing decisions on accurate and meaningful information about environmental performance.

2. Products and processes that achieve the above objectives to the extent currently possible and practical have been selected and included in these Construction Documents. The Contractor is responsible to maintain and support these objectives in developing means and methods for performing the work of this Contract and in proposing product substitutions and/or changes to specified processes.

1.3 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Specification Section 01: Requirements, apply to this Section.

B. Related Sections include the following:

1. Section 02 through to Section 19 for Sustainable Design Requirements specific to the Work of each of those Sections.

2. Section 01 62 00: DMGBR Requirements for submittal procedures.

3. Section 01 74 19: Construction Waste Management.

4. Annexure 1: Construction Waste Management Plan
5. Annexure 2: Construction Indoor Air Quality Management Plan

1.4 DEFINITIONS

A. Agrifiber Products: Composite panel products derived from agricultural fiber

B. Biobased Product: A product determined to be a commercial or industrial product (other than food or feed) that is composed, in whole or in significant part, of biological products or renewable domestic agricultural materials (including plant, animal, and marine materials) or forestry materials

C. Biobased Content: The weight of the biobased material divided by the total weight of the product and expressed as a percentage by weight

D. Certificates of Chain-of-Custody: Certificates signed by manufacturers certifying that wood used to make products has been tracked through its extraction and fabrication to ensure that is was obtained from forests certified by a specified certification program
E. Composite Wood: A product consisting of wood fiber or other plant particles bonded together by a resin or binder

F. Construction and Demolition Waste: Includes solid wastes, such as building materials, packaging, rubbish, debris, and rubble resulting from construction, remodeling, repair and demolition operations. A construction waste management plan is to be provided by the Contractor as defined in Section 01 74 19.

G. Recycled Content Materials: Products that contain pre-consumer or post-consumer materials as all or part of their feedstock
H. Post-Consumer Recycled Content: The percentage by weight of constituent materials that have been recovered or otherwise diverted from the solid-waste stream after consumer use

I. Pre-Consumer Recycled Content: Materials that have been recovered or otherwise diverted from the solid-waste stream during the manufacturing process. Pre-consumer content must be material that would not have otherwise entered the waste stream as per Section 5 of the FTC Act, Part 260 “Guidelines for the Use of Environmental Marketing Claims”: www.ftc.gov/bcp/grnrule/guides980427

J. Regional Materials: Materials that are extracted, harvested, recovered, and manufactured & transported within maximum traveling distance of 500 km from the furthest point of origin to the Project site

K. Sealant: Any material that fills and seals gaps between other materials

L. Volatile Organic Compounds (VOCs): Any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions. Compounds that have negligible photochemical reactivity, listed in EPA 40 CFR 51.100(s), are also excluded from this regulatory definition.

1.5 SUBMITTALS

A. General: Additional Sustainable Design submittal requirements are included in other sections of the Specifications.

B. Project’s DMGBR Submittals:

1. Follow all procedures and construction submittals referred to in Dubai Municipality Green Buildings Regulations (DMGBR) Guide.

2. Heat Island Effect:

   a. Site Paving: Provide manufacturer’s cut sheets for all impervious paving materials, highlighting the Solar Reflectance Index (SRI) of the material aiming for SRI>29. Also, provide cut sheets for all pervious paving materials.
   b. Roofing Materials: Submittals for roofing materials must include manufacturer’s cut sheets or product data highlighting the Solar Reflectance Index (SRI) of the material aiming for SRI>78 .

      Note: SRI values for the outer surface of cover elements can be calculated based on solar reflectance and emittance numbers as defined in the American Society of Testing and

Materials Standard E1980-01. Alternatively manufacturer's evidence can be supplied where the testing is in accordance with the referenced standards below:

- ASTM E1980 - 01 Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces
- ASTM E1918-06, Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field
- ASTM C1549-09, Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer
- ASTM E 408-71(2008), Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques
- ASTM C1371-04a, Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers

3. Exterior Lighting Fixtures: Submittals must include cut sheets with manufacturer's data on initial fixture lumens above 90° from nadir for all exterior lighting fixtures, and, for parking lot lighting, verification that the fixtures are classified by the IESNA as "full cutoff" (FCO); OR provide documentation that exterior luminaires are IDA-Approved as Dark-Sky Friendly by the International Dark Sky Association (IDA) Fixture Seal of Approval Program.

4. Irrigation Systems: Provide manufacturer's cut sheets for all permanent landscape irrigation system components and for any rainwater harvesting system components, such as cisterns.

5. Water Conserving Fixtures: Submittals must include manufacturer's cut sheets for all water-consuming plumbing fixtures and fittings (toilets, faucets, showerheads, etc.) highlighting maximum flow rates and/or flush rates. Include cut sheets for any automatic faucet-control devices, refer to sanitary fixtures specs.

6. Elimination of CFCs AND HCFCs: Provide manufacturer's cut sheets for all cooling equipment with manufacturer's product data, highlighting refrigerants; provide manufacturer's cut sheets for all fire-suppression equipment, highlighting fire-suppression agents; provide manufacturer's cut-sheets for all polystyrene insulation (XPS) and closed-cell spray foam polyurethane insulation, highlighting the blowing agent(s).

7. Measurement and Verification Systems: Provide cut sheets and manufacturer's product data for all controls systems, highlighting electrical metering and trending capability components.

8. Outdoor Air Delivery Monitoring: Provide manufacturer's cut sheets highlighting the installed carbon dioxide monitoring system components and sequence of controls shop drawing documentation, including CO2 differential set-points and alarm capabilities.

9. Interior Adhesives and Sealants: Submittals for all field-applied adhesives and sealants, which have a potential impact on indoor air, must include manufacturer's MSDSs or other Product Data highlighting VOC content. Provide manufacturers' documentation verifying all adhesives used to apply laminates, whether shop-applied or field-applied, contain no urea-formaldehyde. These paints and coatings must be accredited/certified from Dubai Central Lab or any source approved by Dubai Municipality

10. Interior Paints and Coatings: Submittals for all field-applied paints and coatings, which have a potential impact on indoor air, must include manufacturer's MSDSs or other Product Data highlighting VOC content, these paints and coatings must be accredited/certified from Dubai Central Lab or any source approved by Dubai Municipality

1. Exterior Paints and Coatings: Submittals for all field-applied paints and coatings, which have a potential impact on ambient air quality, must include manufacturer's MSDSs or other manufacturer's Product Data highlighting VOC content.

2. Floor coverings:

a. Carpet Systems: Submittals for all carpet must include the following:

-Manufacturer's product data verifying that all carpet systems meet or exceed the testing and product requirements of the Carpet and Rug Institute Green Label Plus program. Each new carpet system used must be certified / accredited from Dubai Central Lab or any other source approved by Dubai Municipality (DM).

b. Resilient Flooring: Submittals for all resilient floorcovering must include manufacturer's product data verifying certification under FloorScore indoor emissions testing program.

c. Engineered Wood Flooring and Bamboo Flooring: Submittals for all engineered wood flooring and bamboo flooring must include manufacturer's product data verifying certification under either the Greenguard or FloorScore indoor emissions testing program.

3. Suspended Ceiling Systems: Demonstrate that all suspended ceiling systems comply with the requirements of BS EN 13964: 2004 section 4.5, in relation to asbestos (no asbestos) and formaldehyde content (which must meet class E1 at a minimum and be tested, classified and appropriately marked).
4. Non-Suspended Ceiling Systems: Comply with the VOC requirements for Adhesives and Sealants & for Paints and Coatings.
5. For any wood based paneled ceilings, comply with the requirements of BS EN 13986:2004 in relation to limits and testing requirements for formaldehyde VOC content (which must meet class E1 at a minimum) and do not exceed 5 parts per million (ppm) for Pentachlorophenol (PCP) content. For any wood based paneled ceilings, comply with the requirements of BS EN 13986:2004 in relation to limits and testing requirements for formaldehyde VOC content (which must meet class E1 at a minimum) and do not exceed 5 parts per million (ppm) for Pentachlorophenol (PCP) content.
6. Composite Wood and Agrifiber Binders: Submittals for all composite wood and agrifiber products (including but not limited to particleboard, wheatboard, strawboard, agriboard products, engineered wood components, solid-core wood doors, OSB, MDF, and plywood products) must include manufacturer's product data verifying that these products contain no urea-formaldehyde resins.
7. All internal construction materials: do not exceed formaldehyde VOC content class E1 levels.

8. Third party evidence showing certification of formaldehyde content tested, according to appropriate testing standards:
   • EN 717-1 for initial type testing, www.bsigroup.com
   • EN120 and EN 717-2 for factory production control, www.bsigroup.com
   By one of the following:
   - Reputable certified independent testing laboratory; or
   - Certification from a reputable third party assessment body.

9. Entryway Systems: Provide manufacturer's cut sheets for all walk-off systems installed to capture particulates, including permanently installed grates, grilles, slotted systems, direct glue-down walk-off mats, and non-permanent roll-out mats.

10. Air Filtration: Provide manufacturer's cut sheets and product data highlighting the following:

a. Minimum Efficiency Reporting Value (MERV) for filtration media in all air handling units (AHUs)

b. Minimum Efficiency Reporting Value (MERV) for filtration media installed at return air grilles during construction if permanently installed AHUs are used during construction

21. Mercury in Lighting: Provide manufacturer's cut sheets or product data for all fluorescent or HID lamps highlighting mercury content.

22. Lighting Controls: Provide manufacturer's cut sheets and shop drawing documentation highlighting all lighting controls systems components.

23. Thermal Comfort Controls: Provide manufacturer's cut sheets and shop drawing documentation highlighting all thermal comfort-control systems components.

24. Gypsum Wall Board: Provide manufacturer's cut sheets or product data verifying that all gypsum wallboard products are moisture and mold-resistant.

25. Fiberglass Insulation: Provide manufacturer's cut sheets or product data verifying that fiberglass batt insulation contains no urea-formaldehyde.

26. Duct Acoustical Insulation: Provide manufacturer's cut sheets or product data verifying that mechanical sound insulation materials in air distribution ducts consists of an impervious, non-porous coatings that prevent dust from accumulating in the insulating materials.

C. Erosion and Sedimentation Control: See Erosion and Sedimentation Control Reference Guide for sample Erosion and Sedimentation Control Plan.

D. Construction Waste Management: See Section 01 74 19 "Construction Waste Management" for submittal requirements. Waste reduction progress reports and logs complying with the requirements of Section 01 74 19 "Construction Waste Management."

E. Sustainable Construction Progress Reports: Concurrent with each Application for Payment, submit reports for the following:
- Construction Waste Management: Waste reduction progress reports and logs complying with the requirements of Section 01 74 19 "Construction Waste Management."

1.6 QUALITY ASSURANCE

A. General: Perform the work of this Section as a supplement and in accordance with applicable requirements of Specification Section 01: GENERAL "Contractor Quality Control Program."

B. Preconstruction Meeting: After award of Contract and prior to the commencement of the Work, schedule and conduct meeting with Employer, Engineer and all Subcontractors to discuss the Construction Waste Management Plan and all other Sustainable Design Requirements. The purpose of this meeting is to develop a mutual understanding of the Project's Sustainable Design Requirements and coordination of the Contractor's management of these requirements with the Contracting Officer and the Construction Quality Manager.

C. Construction Job Conferences: The status of compliance with the Sustainable Design Requirements of these specifications will be an agenda item at all regular job meetings conducted during the course of work at the site.

Part 2 - PRODUCTS

2.1 PRODUCT ENVIRONMENTAL REQUIREMENTS

A. Do not burn rubbish, organic matter, etc. or any material on the site. Dispose of legally in accordance with Specifications Sections 01 74 19.

B. Site Paving: All site impervious paving must be light colored, with a Solar Reflectance Index (SRI) of at least 29.

C. Roofing Materials: All roofing systems, other than vegetated roof systems, must comply with the following requirements:

1. Low-Sloped roofing less than or equal to 2:12 slope must have an SRI of at least 78.
2. Steep-Sloped roofing greater than 2:12 slope must have an SRI of at least 29.

B. Regional Materials: the project is targeting 5% minimum percentage of regional materials from the total construction cost as per the following equation:

$$\text{Percent Regional Content} = \frac{\text{Total Regional Content Value} \times 100}{\text{Total Materials Cost}} \ \%$$

Total Material Cost: exclude labor and equipment costs and include the following divisions from the Construction Specifications Institute (CSI) Master Format TM or equivalent: Division 03 Concrete, Division 04 Masonry, Division 05 Metals, Division 06 Wood, Plastics, and Composites, Division 07 Thermal and Moisture Protection, Division 08 Openings, Division 09 Finishes, Division 10 Specialties, Division 31 Earthwork, Division 32 Exterior Improvements.

Regional materials are defined as materials that are extracted/harvested/recovered & manufactured within traveling distance not greater than 500 km from the furthest point of origin to the project site.

The project's targeted regional materials are primarily:
- Masonry cement
- Cement Blocks
- Interlock precast concrete tiles.

C. Recycled Content of Materials:

1. Provide building materials with recycled content such that post-consumer recycled content value plus half the pre-consumer recycled content value constitutes a minimum of 5% of the cost of materials used for the Project, exclusive of all MEP equipment, labor, and delivery costs. The Contractor shall make all attempts to maximize the procurement of materials with recycled content.

a. The post-consumer recycled content value of a material shall be determined by dividing the weight of post-consumer recycled content by the total weight of the material and multiplying by the cost of the material.

b. The pre-consumer recycled content value of a material shall be determined by dividing the weight of pre-consumer recycled content by the total weight of the material and multiplying by the cost of the material.

c. Do not include mechanical and electrical components in the calculations.

d. Do not include labor and delivery costs in the calculations.

e. Recycled content of materials shall be defined according to the Federal Trade Commission's "Guide for the Use of Environmental Marketing Claims," 16 CFR 260.7 (e).

f. Utilize all on-site existing paving materials that are scheduled for demolition as granulated fill, and include the cost of this material had it been purchased in the calculations for recycled content value.

g. At a minimum, the materials in the following list must contain the minimum recycled content indicated:

Category	**Minimum Recycled Content**
Compost/mulch	100% post-consumer
Asphaltic Concrete Paving	25% post-consumer
Cast-in-Place Concrete	6% pre-consumer
CMU: Gray Block	20% pre-consumer
Steel Reinforcing Bars	90% combined
Structural Steel Shapes	90% combined
Steel Joists	75% combined
Steel Deck	75% combined
Steel Fabrications	60% combined
Steel Studs	30% combined
Steel Roofing	30% post-consumer
Aluminum Fabrications	35% combined

Rigid Insulation	20% pre-consumer
Batt insulation	30% combined
Cellulose Insulation	90% combined
Rock Wool Insulation	75% pre-consumer
Fireproofing	20% combined
Steel Doors and Frames	35% combined
Gypsum Wallboard	100% combined
Carpet	40% combined
Ceramic Tile Flooring	60% combined
Rubber Flooring and Base	60% combined
Acoustical Ceiling Tile (ACT)	40% post-consumer
ACT Suspension System	90% post-consumer
Toilet Partitions	60% post-consumer

The calculation of recycled content value (RCV) is as follows:

Recycled Content Value = Percentage of Recycled Content x Material Cost

$$\text{Percent Recycled Content} = \frac{\text{Total RCV} \times 100}{\text{Total Materials Cost}} \%$$

D. Recycled Aggregates: Only recycled aggregates/ aggregates from industrial waste by-products are to be used as base, sub-base.

E. Use of Supplementary Cementing Materials (SCMs) to reduce Embodied Greenhouse Gas Emissions of concrete, as per the approved design submission calculations and in reference with the structural design drawings for concrete mix design.

F. Exterior Lighting Fixtures:

1. All exterior luminaries must emit maximum 10% of the total initial designed fixture lumens at an angle above 90° from nadir and/or meet the requirements of the Dark Sky certification program.

2. The average Lighting Power Density for the exterior connected lighting load must be no more than the values given in Table 502.05 (1).

Building Area	Maximum Watts per square metre or linear metre
Uncovered parking lots and drives	1.6 W/m²
Walkways less than 3 metres wide	3.3 W/linear metre
Walkways 3 metres wide or greater	2.2 W/m²
Outdoor Stairways	10.8 W/m²
Main entries	98 W/linear metre of door width
Other doors	66 W/linear meter of door width
Open sales areas (including vehicle sales lots)	5.4 W/m²
Building Facades	2.2 W/m² for each illuminated wall or surface or 16.4 W/linear metre for each illuminated wall or surface length
Entrances and gatehouse inspection stations at guarded facilities	13.5 W/m²
Drive-up windows at fast food restaurants	400 W per drive-through

Lighting Power Densities for exterior areas not listed in Table 502.05 (1) should be no greater than those values given in ASHRAE 90.1-2007 Table 9.4.5or equivalent as approved by DEWA

G. Water-Conserving Fixtures: Plumbing fixtures and fittings shall use approved fixtures flow/flush rates and the selection indicated in the mechanical specification.

H. Elimination of CFCs AND HCFCs:

1. Ozone Protection: Base building cooling equipment shall contain no refrigerants other than the following: HCFC-123, HFC-134a, HFC-245fa, HFC-407c, or HFC 410a.

2. Fire suppression systems may not contain ozone-depleting substances.

3. Extruded polystyrene insulation (XPS) and closed-cell spray foam polyurethane insulation shall not be manufactured with hydrochlorofluorocarbon (HCFC) blowing agents.

I. HVAC Distribution Efficiency:

1. All duct systems shall be constructed of galvanized sheet metal, aluminum, or stainless steel as deemed appropriate based on the application requirements. No fiberglass duct board shall be permitted, Lining for ducts shall be flexible elastomeric acoustical insulation that meets the following:
   - A 3-6 PCF density, closed-cell, non-porous, fiber-free, CFC- and HCFC-free,
   - Resists mold growth and effectively retards the flow of moisture vapour, Water Vapor Permeability shall be <0.06 as per ASTM E 96 and Water Absorption % (Volume Change) shall be <0.20 as per ASTM C 209
   - Low VOC material, meeting the requirements for the “Children & Schools” and “Indoor Air Quality” classifications.
   - Acceptable for use in square, rectangular, round or oval duct or plenum applications and air handling equipment
   - Meeting the requirements of NFPA 90A and 90B.
   - Its flame spread rating of 25 or less and a smoke development rating of 50 or less as tested by ASTM E 84, “Surface Burning Characteristics of Building Materials”.
   - Shall meet GREENGUARD requirements under the “Children & Schools” and “Indoor Air Quality” classifications
   - Liner could be with or without a factory-applied scrim-reinforced acrylic adhesive on one side

2. All medium- and high-pressure ductwork systems shall be pressure-tested in accordance with the current SMACNA standards.

3. All ductwork shall be externally insulated. No interior duct liner shall be permitted.

4. Where possible, all air terminal connections shall be hard-connected with sheet metal ductwork. If flexible ductwork is used, no flexible duct extension shall be more than six feet in length.

5. All HVAC equipment shall be isolated from the ductwork system with flexible duct connectors to minimize the transmittance of vibration.
6. All supply and return air branch ducts shall include the appropriate style of volume damper. Air terminal devices such as grilles, registers, and diffusers shall be balanced at duct branch dampers, not at terminal face.

J. Biobased Products:

1. Use only biobased concrete form-release products.

2. Asbestos Containing Material (ACM) & Preservative-treated lumber with chromated copper arsenate (CCA) treatments is not permitted, and lumber with copper-based treatments (such as ACQ) is permitted only for ground-contact applications.

3. Wood-based materials include but are not limited to the following materials (when made from wood), engineered wood products, or wood-based panel products:

- Rough carpentry
- Miscellaneous carpentry
- Heavy timber construction
- Wood decking
- Particleboard
- Plywood
- Metal-plate-connected wood trusses
- Structural glued-laminated timber
- Finish carpentry
- Architectural woodwork
- Wood paneling
- Wood veneer wall covering
- Wood flooring
- Wood lockers
- Wood cabinets
- Wood doors
- Non-rented temporary construction, including bracing, concrete formwork, pedestrian barriers, and temporary protection

K. Brominated Flame Retardants: For new furniture, do not utilize cushioned office seating, and for lounge seating, do not utilize cushioned seating with brominated flame retardants.

N. Zero ODP, Low GWP Insulation: All thermal insulation materials used in the project to have an Ozone Depleting Potential of zero (ODP = 0) and a low Global Warming Potential of less than five (GWP <5). Compliance is required for any blowing agent used to manufacture the insulation product or to spray it in place.

O. Insulation materials to be incorporated into the building must:
- Be manufactured without the use of Chlorofluorocarbons (CFC's);
- Be non-toxic and not release toxic fumes during combustion;
- Have 0.05 parts per million (ppm) or less of added formaldehyde

- Have a Threshold Limit Value (TLV) of 0.1 or less of Individual Volatile Organic Compounds
- Be fire resistant in accordance with the requirements of Dubai Civil Defence
- Be accredited / certified from Dubai Central Lab
- Achieve all the requirements of the approved specifications by Dubai Municipality
- All thermal and acoustical insulation must be installed as per the manufacturer's instructions after approval from Dubai Municipality.

P. Chlorine Free Materials: Minimize the percentage used of chlorine-based materials including Polyvinyl Chloride (PVC), Chlorinated polyethylene (CPE), Chlorinated polyvinyl chloride (CPVC), Chlorosulfonated polyethylene (CSPE), and Polychloroprene with more sustainable alternatives for three or more of the following building product groups (The proportions required are indicated below):
- Waterproofing sheets and membranes (50% or more by surface area);
- Floor and wall coverings (90% or more by surface area);
- Windows and door frames (90% or more by linear length);

Q. Low Toxicity Materials: Eliminate materials or building products or components containing elements or compounds with the following R-phrase attribution under EU Risk Phrases (R-Phrases) listed in Annex III of EU Directives 67/548/EEC, all building materials must not contain materials or compounds with over **1%** of constituent materials with designated **R** phrases:
- R20 - Harmful by inhalation.
- R21 - Harmful in contact with skin.
- R22 - Harmful if swallowed.
- R23 - Toxic by inhalation.
- R24 - Toxic in contact with skin.
- R25 - Toxic if swallowed.
- R26 - Very toxic by inhalation.
- R27 - Very toxic in contact with skin.
- R28 - Very toxic if swallowed.
- R29 - Contact with water liberates toxic gas.
- R31 - Contact with acids liberates toxic gas.
- R32 - Contact with acids liberates very toxic gas.
- R33 - Danger of cumulative effects.
- R36 - Irritating to eyes.
- R37 - Irritating to respiratory system.
- R38 - Irritating to skin.
- R39 - Danger of very serious irreversible effects.
- R41 - Risk of serious damage to eyes.
- R42 - May cause sensitization by inhalation.
- R43 - May cause sensitization by skin contact.
- R45 - May cause cancer.
- R46 - May cause heritable genetic damage.
- R48 - Danger of serious damage to health by prolonged exposure.
- R49 - May cause cancer by inhalation.
- R50 - Very toxic to aquatic organisms.
- R51 - Toxic to aquatic organisms.
- R52 - Harmful to aquatic organisms.
- R53 - May cause long-term adverse effects in the aquatic environment.
- R54 - Toxic to flora.
- R55 - Toxic to fauna.
- R56 - Toxic to soil organisms.
- R57 - Toxic to bees.
- R58 - May cause long-term adverse effects in the environment.
- R59 - Dangerous for the ozone layer.
- R60 - May impair fertility.
- R61 - May cause harm to the unborn child.
- R62 - Possible risk of impaired fertility.

- R63 - Possible risk of harm to the unborn child.
- R64 - May cause harm to breastfed babies.
- R65 - Harmful: may cause lung damage if swallowed.

R. Adhesives and Sealants:

1. All adhesives and sealants, regardless of where they are used, must comply with the following prescribed limits for VOC content in south Coast Air Quality management District Rule 1168"Adhesive & Sealant Applications:

- Concrete Curing Compound: 60 g/L
- Concrete Sealer: 10 g/L
- Concrete Form Release Agents: 0g/L
- Garage Deck Sealer: 50g/L
- Wood Glues: 20 g/L
- Millwork and Casework Adhesives: 20g/L
- Metal to Metal Adhesives: 30 g/L
- Adhesives for Porous Materials (Except Wood): 50 g/L
- Subfloor Adhesives: 50 g/L
- Plastic Foam Adhesives: 50 g/L
- Carpet Adhesives: 50 g/L
- Carpet Pad Adhesives: 50 g/L
- Carpet Seam Sealer: 50g/L
- VCT and Sheet Vinyl Adhesives: 50 g/L
- Cove Base Adhesives: 50 g/L
- Rubber Floor Adhesives: 60 g/L
- Wood Flooring Adhesives: 100 g/L
- Ceramic Tile Adhesives: 65 g/L
- Gypsum Board and Panel Adhesives: 50 g/L
- Gypsum Drywall Joint Compound: 20 g/L
- Portland Cement Plaster: 20 g/L
- Multipurpose Construction Adhesives: 70 g/L
- Cast Resin Countertop Silicone Sealant: 20g/L
- Plastic Laminate Adhesives: 20 g/L

- General Contact Adhesive: 80 g/L
- Structural Glazing Adhesives and Compounds: 100 g/L
- Silicone Sealant: 50 g/L
- Pipe Thread Sealant: 50 g/L
- Duct Sealant: 10 g/L
- Plastic Cement Welding Compounds: 250 g/L
- ABS Welding Compounds: 400 g/L
- CPVC Welding Compounds: 270 g/L
- PVC Welding Compounds: 150 g/L
- Adhesive Primer for Plastic: 250 g/L
- Architectural Sealants: 250 g/L
- Single-Ply Roofing Membrane Adhesives: 250 g/L

2. Interior sealants shall not contain: mercury, butyl rubber, neoprene, SBR (styrene butadi-ene rubber), or nitrile.

3. Sealants and glazing compounds formulated with aromatic solvents (organic solvent with a benzene ring in its molecular structure) fibrous talc or asbestos, formaldehyde, halo-genated solvents, mercury, lead, cadmium, hexavalent chromium, or their components shall not be used.

4. Adhesives used to apply laminates, whether shop-applied or field-applied, shall contain no urea-formaldehyde.

S. Paints and Coatings:

1. Interior Paints and Coatings: For interior field-applied applications, use paints and coatings that comply with the following limits for VOC content as per AnnexII, Phase II, Table A of European Directive 2004/42/CE:2004:

Maximum VOC content limits :

Product Category	Type**	Phase II (g/l)*
Interior matt walls and ceilings (Gloss <25 @60°)	WB SB	30 30
Interior glossy walls and ceilings (Gloss >25 @60°)	WB SB	100 100
Interior trim and cladding paints for wood and metal	WB SB	130 300
Interior trim varnishes and wood stains, including opaque wood stains	WB SB	130 400
Interior minimal build wood stains	WB SB	130 700
Primers	WB SB	30 350
Binding Primers	WB SB	30 750
One-pack performance coatings	WB SB	140 500
Two-pack reactive performance coatings for specific end use such as floors	WB SB	140 500
Multi-colored coatings	WB SB	100 100
Decorative effect coatings	WB SB	200 200

*g/l of ready to use product
** WB = Water Based, SB = Solvent Based

a. Water-Based Polychromatic Finish Coatings: Not more than 150 g/L (150 g/L for primer and flat polychromatic paint)

b. Anti-Corrosive Coatings: Not more than 100 grams of VOC per liter of coating less water and exempt compounds.

c. Sanding Sealers: Not more than 50 grams of VOC per liter of coating less water and exempt compounds.

d. Waterproofing Sealers: Not more than 100 grams of VOC per liter of coating less water and exempt compounds.

e. Concrete Slab Sealers: Not more than 10 grams of VOC per liter of coating less water and exempt compounds

f. Polyurethanes: Not more than 100 grams of VOC per liter of coating less water and exempt compounds

g. Stains: Not more than 250 grams of VOC per liter of coating less water and exempt compounds

2. Interior field applied varnishes and lacquers are not permitted.

3. Aromatic Compounds: Paints and coatings shall not contain more than 1% (by weight) total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).

4. Restricted Components: Paints and coatings shall not contain any of the following:

a. Acrolein

b. Acrylonitrile

c. Analine dyes

d. Antimony

e. Benzene

f. Butyl benzyl phthalate

g. Cadmium

h. Di (2-ethylhexyl) phthalate

i. Di-n-butyl phthalate

j. Di-n-octyl phthalate

k. 1,2-dichlorobenzene

l. Diethyl phthalate

m. Dimethyl phthalate

n. Ethylbenzene

o. Formaldehyde

p. Hexavalent chromium

q. Isophorone

r. Lead

s. Mercury

t. Methyl ethyl ketone

u. Methyl isobutyl ketone

v. Methylene chloride

w. Naphthalene

x. Toluene (methylbenzene)

y. 1,1,1-trichloroethane

z. Vinyl chloride

T. Floor coverings:

1. All carpet systems, including adhesives, must meet or exceed the Carpet and Rug Institute Green Label Plus Indoor Air Quality Test Program.

2. Carpet cushion shall not contain brominated flame retardants.

3. Carpet tile applications shall be self-adhering.

4. All resilient floorcovering must be certified under the Greenguard or FloorScore indoor emissions testing programs.

5. Engineered wood flooring and bamboo flooring must be certified under the Greenguard or FloorScore indoor emissions testing programs.

U. Composite Wood and Agrifiber Binders: All composite wood, agrifiber products, and wood doors shall contain no added urea-formaldehyde resins.

V. At least 25% (by volume) of the specified timber and composite wood products used on the project, including temporary construction timber, is reused OR certified (with Chain of Custody Certification: CoC) under any one or any combination of the following certification schemes:
- Forest Stewardship Council (FSC), or
- Program for the Endorsement of Forest Certification scheme (PEFC) or the following national schemes endorsed by PEFC: the Canadian Standards Association, CSA, the Sustainable Forestry Initiative SFI and the Malaysian Timber Certification Scheme MTCS; And

Also, demonstrate that all timber is legally sourced and not on the CITES (Convention on International Trade in Endangered Species) list of endangered species (Appendix I, II and III).

W. Entryway Systems: Walk-off systems to capture particulates shall be installed at least 6 feet long in the direction of entry travel at all entryways directly connected to the outdoors that are used as regular entry points by building users. Acceptable entryway systems include:

1. Permanently installed grates, grilles, or slotted systems that allow for cleaning beneath them

2. Permanently installed direct glue-down walk-off mats

3. Non-permanent roll-out mats, but only if a service organization is contracted for maintenance on a weekly basis

X. Air Filtration: Install air filtration media that provides a Minimum Efficiency Reporting Value (MERV) of 13 or better in all air handling units for processing both return and outside air that is delivered to the air supply system. Replace all filtration media after the completion of construction and prior to occupancy.

Y. Mercury in Lighting:

1. Provide only low-mercury fluorescent or HID lamps with mercury content limited to the following:

   a. T-5 and T-8 fluorescent lamps: 80 picograms per lumen hour

2. Measurement Standards: Lumens to be measured according to IES LM9 for linear fluorescent lamps, IES LM66 for compact fluorescent lamps, and LM51 for HID lamps; mercury content to be measured according to U.S. EPA “Total Mercury by Cold Vapor Absorption Method” 7471A.

Z. Lighting Controls: Install and calibrate controls as specified by Section 13 – Electrical; in order to comply with DMGBR lighting controllability requirements.

AA. Thermal Comfort: Install and calibrate controls as specified in Section 12: PLUMBING AND MECHANICAL ENGINEERING INSTALLATIONS.

BB. Gypsum Wallboard: Standard paper-faced gypsum wallboard can be used only in dry climates, where wetting during or after construction is not anticipated. In humid climates, where dampness and condensation are a concern, use only non-paper-faced gypsum wallboard. In wet locations a cementitious wallboard, made of Portland or magnesium oxide cement, must be used.

CC. Fiberglass Insulation: Fiberglass batt insulation shall contain no formaldehyde-based binders or shall be third-party certified for conformance with Greenguard Children & Schools or Indoor Advantage Gold.

DD. Duct Acoustical Insulation: Mechanical sound insulation materials within the duct shall consist of an impervious, non-porous coating that prevents dust from accumulating in the insulating materials.

PART 3 - EXECUTION

3.1 CONSTRUCTION WASTE MANAGEMENT

A. Develop and implement a Construction Waste Management Plan (CWMP), as defined in Section 01 74 19 “Construction Waste Management,” quantifying material diversion by weight in order to recycle, reuse, and/or salvage at least 50% (by weight/ volume) of construction, demolition, and land-clearing waste.

B. Clean materials which are contaminated prior to placing in collection containers. Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

C. Utilize any on-site existing paving materials that are scheduled for demolition as granulated fill or sub-base material, and include the weight of this material in the calculations for material diverted from landfill disposal.

D. Arrange for materials collection by or materials delivery to the appropriate recycling or reuse facility.

E. Tax credits and other savings obtained or revenue generated for recycled or reused materials accrue to the Contractor.

F. Discuss CWMP procedures and measures as an agenda item at all regular job meetings conducted during the course of work at the site, and record progress in meeting minutes.

G. Submit monthly progress reports with Applications for Payment in accordance with Section 01 74 19, documenting the status of the CWMP and current diversion percentage rates.

3.2 CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT

A. Develop and implement a Construction IAQ Management Plan (CIAQMP) to prevent indoor air quality problems resulting from construction activities, including, at minimum, the following:

1. Construction activities must meet or exceed the minimum requirements of the SMACNA IAQ Guideline for Occupied Buildings under Construction, 1995.

2. During construction, protect all absorptive materials stored on-site or installed from moisture damage as described in the Construction IAQ Management Plan (CIAQMP) defined above. Specifically:

   a. Exercise special care at all times in the storage of materials to prevent exposure to moisture.

   b. Avoid installation of gypsum wallboard and other porous materials until the building is weather-tight.

   c. All standing water which accumulates on interior floors shall be removed on the day that it is observed.

   d. Any drywall that has retained more than 20% moisture after 48 hours following exposure to moisture, or that has evidence of mold, must be disposed of in accordance with Specification Section 01 74 19 “Construction Waste Management.”

   e. The contractor shall identify and remove all porous building materials that become wet or damaged by moisture within 7 calendar days of such exposure.

3. During construction and HVAC system installation, provide the Engineer with photographs of IAQ management measures (such as protection of ducts and on-site or installed absorptive materials), including six photographs on three different occasions depicting implemented SMACNA approaches.

B. Air Filtration:

1. Install air filtration media that provides a Minimum Efficiency Reporting Value (MERV) of 13 or better in all air handling units for processing both return and outside air that is delivered to the air supply system; replace all filtration media after the completion of construction and prior to occupancy.
2. Install air filtration media that provides a Minimum Efficiency Reporting Value (MERV) of 8 or better for filtration media installed at return air grilles during construction if permanently installed AHUs are used during construction. Inspect weekly and replace as required.

3. Discuss CIAQMP procedures and measures as an agenda item at all regular job meetings conducted during the course of work at the site, and record progress in meeting minutes.

3.3 Construction Environmental Management & Pollution Prevention

A. Neither the construction activity nor the operation of the building may cause land disturbances, surface runoff, soil erosion or sedimentation on any other property beyond the boundary of the plot.

B. Drainage must avoid pollution of watercourses and groundwater. Discharges made directly to ground, storm or marine waters must comply with the requirements of Dubai Municipality

C. Dust suppression techniques must ensure that dust generated by construction and demolition activities must meet the requirements of Code of Construction Safety Practice issued by Dubai Municipality.

D. Construction waste materials generated on site must be segregated and stored on site prior to collection. Segregation must, at a minimum, include labelled storage for inert aggregates, metals, timber, dry recyclables and hazard material.

E. For the disposal of hazardous waste, permit must be prepared and obtained from Dubai Municipality Environment Department. The hazardous waste must be transported in accordance with the requirements of DM Technical Guidelines and DM Code of Construction Safety Practice.

F. With the exclusion of drinking, toilet activities and concrete works, potable water cannot be used for construction activities on any project site

G. Construction and demolition noise must be no greater than that detailed in DM Technical Guidelines and DM Code of Construction Safety Practice.

H. Chemicals, fuels, solvents or hazardous wastes must be stored in accordance DM Technical Guidelines and DM Code of Construction Safety Practice.

I. Light pollution from the construction site must be minimized by ensuring that light sources are directed inwards and angled down so that no light is emitted above the horizontal plane. Lux levels should meet the DM Code of Construction Safety Practice.

3.4 General Commissioning

The commissioning of air distribution systems, water distribution systems, lighting, central control and building management systems, refrigeration systems and boilers must be carried out before a completion certificate will be issued.

1. Commissioning must be carried out in accordance with the CIBSE Codes listed below or any other commissioning Standard or Code approved by Dubai Municipality (DM).
   - 1.1. 'The Chartered Institution of Building Services Engineers (CIBSE) Commissioning Code, Air Distribution Systems, Code A-2006'
   - 1.2. 'CIBSE Commissioning Code, Water Distribution Systems, Code W-2003'
   - 1.3. 'CIBSE Commissioning Code, Lighting, Code L-2003'
   - 1.4. 'CIBSE Commissioning Code, Automatic Controls, Code C-2001' for central control and Building Management System (BMS);
   - 1.5. 'CIBSE Commissioning Code R: 2002 Refrigeration Systems; and
   - 1.6. 'CIBSE Commissioning Code B: 2002 Boilers'.
2. Work must be carried out by a company approved by DM to conduct commissioning of buildings.
3. Commissioning results must be recorded and available for inspection by DM
4. A systems manual, documenting the information required to allow future operations staff to understand and optimally operate the commissioned services, must be developed and provided to the building owner or facilities operator following commissioning.

Construction Submission:

1. Commissioning report signed by the Competent Person detailing the results of the systems verification and confirming that all systems are operating as intended;
2. Occupant Handbook and confirmation that this has been provided to the project owner.

3.5 Building's Envelop Testing and Commissioning

U Values for glazing, walls, roof, floor & Insulation type; this section to be read in conjunction with: SECTION 07 21 00 / THERMAL INSULATION, SECTION 08 51 13 /ALUMINIUM DOORS AND WINDOWS & project's drawings. The main contractor is required to demonstrate compliance with the following U-Values prior to the procurement of the envelope components, through the provision of test certificates, updated area weighted average U-Values calculations and drawings:

Overall U-Value for the External Walls:

- **None Structural Elements: Max.0.4 W/M^2.K**
- **Structural Elements {Beams/Slabs, etc.]: Max.0.57 W/M^2.K**

Overall U-Value for the External Roofs: Max.0.3 W/M^2.K

Basement & Exposed Floors (Slabs between Conditioned & Unconditioned Floors) U-value: Max.0.3 W/M^2.K

Overall U-Value for the Fenestration System [Glass + Alum.]: Max.2.1 W/M^2.K

SHGC for Glazing: 0.21

VLT for Glazing [Except Retails]: Max 40%

The materials, components, systems, and assemblies that comprise the above and below-grade building exterior enclosure will be evaluated and tested; an *example* of the number system follows:

0100 Architectural Precast Concrete

0101 Precast Panel

0102 Precast Panel to Precast Panel Joint

0103 Precast Panel to Stucco Wall Joint

0104 Precast Panel to Aluminum Window Joint

0105 Precast Panel to Curtain Wall Joint

0106 Precast Panel to Sheet Metal Flashing Joint

0200 Sheet Metal Flashing & Trim

0300 Joint Sealants

0400 Composite Metal Panels

0500 Aluminum Windows

Numbers for Primary System Types and Components

01 Architectural precast concrete
02 Sheet metal flashing & trim
03 Joint sealants
04 Composite metal panels
05 Aluminum windows
06 Glazing
07 Glazed aluminum curtain walls
08 Flat roof
09 Sloped roof

The main contractor is responsible to ensure that required **Air Tightness** designed value of [**10M^3/Hr/M^2**] @ **50** [**Pa**] test pressure. Through field test report, and as per the tests approved codes, CIBSE TM23 – "Testing of buildings for air leakage" (incorporating BS EN 13829:2001), the BSRIA BG 4/2006 protocols below and in accordance with a method approved by Dubai Municipality (DM). Work must be carried out by a company approved by Dubai Municipality (DM).

Functions Required To Be Tested and Test Methods

1. A minimum of 10% of window assemblies and adjacent wall assemblies will be tested including sections previously tested as described in this section.

TABLE 1

Function / Mode	Test Method Manual, Monitoring, Either or Both[3]	Required Seasonal Test[1]
General 1. Sections of exterior wall will be constructed in place and serve as mockups and may remain as part of the installation. The mockups will serve to perfect installation practices prior to the construction of the exterior walls. The mockups shall contain each component of the exterior wall assembly as it will be installed on the remaining building exterior. The mockup shall be tested as an assembly focusing on intersections between assembly components using AAMA 501.2 test method.	Manual	
In addition to, or as part of (1) above, the following modes or tests are required:		
2. Random testing of building exterior using AAMA 501.2 test method as directed by the CxA.	Manual	

Function / Mode	Test Method Manual, Monitoring, Either or Both[3]	Required Seasonal Test[1]
3. Each window model or curtain wall configuration scheduled for installation in the mockups shall be tested and passed by an independent laboratory prior to installation in the mockups in accordance with ASTM E283 test for air leakage. The ASTM E 283 test shall be conducted at an air pressure difference of 6.24 lbs/ft². The maximum allowable rate of air leakage must not exceed .06 ft³/min./ft².	Manual	
4 Each window model or curtain wall configuration scheduled for installation in the mockups shall be tested and passed by an independent laboratory prior to installation in the mockups in accordance with ASTM E331 test for water penetration. The ASTM E 331 test shall be conducted at an air pressure difference of 12.0 lbs/ft². There shall be no water leakage as defined under laboratory specification section of AAMA 501-94 at this pressure difference.	Manual	
5 Each window model or curtain wall configuration scheduled for installation in the mockups shall be tested and passed by an independent laboratory prior to installation in the mockups in accordance with ASTM E330 test for structural performance. No failure or permanent deflection in excess of 0.2 percent of any members span after removing the imposed load for a positive and negative design wind pressure of 120 lbf/sq. ft.	Manual	

a. Exterior Wall Testing: A full-sized mock-up of each type of masonry, limestone Veneer, wood windows, and glazing will be tested in the installation configuration detailed in the construction documents. These assembles will be used to establish the installation practices that will be maintained by the contractors during the assembly of the exterior wall system. Concerns identified during the testing of the mock-ups must be resolved before proceeding with installation of the fenestration system. Testing must be witnessed by the CxA.

2. Acceptance Criteria

   a. For the assemblies tested no moisture intrusion observed through the assembly.

3. Sampling Strategy for Identical Assemblies

   a. All identical assemblies shall be randomly tested per the above tests as directed by the CxA. Ten percent (10%) of the fenestration system will be tested using the AAMA 501.2 test method. In no case test less than three locations for each assembly type. If failure is observed in the first samples tested, an additional 10% of the fenestration system will be tested fully at the responsible contractor's expense.

End of Section 01 6100.

Dubai Municipality Green Buildings Regulations (DMGBR)

Emaar South Development Plot GC04 Parkside2 Dubai, U.A.E.

01 62 00 – Dubai Municipality Green Buildings Regulations (DMGBR) Requirements for submittal procedures

- Main Works -

GENERAL

A. Contractor shall appoint a site sustainability coordinator with the main responsibility to produce the Construction Documentation required.
B. The contractor's Sustainability Manager/ Consultant shall report to the Project Supervision consultant. The Contractor shall prepare and submit all reports and records required to satisfy Dubai Municipality Green Buildings Regulations (DMGBR) requirements.
C. Contractor shall submit to the project supervision consultant (main consultant/site supervision team) comprehensive submittal Log in the beginning of the construction phase. The project Sustainability consultant shall review the submittal Log and provide the contractor with comprehensive List of submittal that will require Sustainability review.
D. Contractor Material approvals for submittal form need to implement a box for Project Sustainability approval
E. Resident Engineer & Project Manager shall carefully evaluate every Change Order
F. Dubai Municipality Green Buildings Regulations (DMGBR) is a contractual requirement. To facilitate this process, the Contractor shall be responsible for the preparation, documentation and submission of Dubai Municipality Green Buildings Regulations (DMGBR) Construction Phase.
G. The Contractor is responsible for the preparation of all documentation including purchase agreements, samples, technical data sheets, MSDS, as-built drawings, invoices, etc as required by Dubai Municipality Green Buildings Regulations (DMGBR). The Contractor is responsible for scanning and uploading the information for Dubai Municipality Green Buildings Regulations (DMGBR) attributes. The Project Sustainability consultant will assist as necessary.
H. Dubai Municipality Green Buildings Regulations (DMGBR) Documentation Submittals: The Contractor is responsible for the preparation, collection and submission of all necessary information to conform to Dubai Municipality Green Buildings Regulations (DMGBR). The extent of documentation necessary shall satisfy Dubai Municipality Green Buildings Regulations (DMGBR) requirements as specified herein and in the other sections of specifications to ensure the sustainable quality of the project development, and any additional specific requirements listed below. The Contractor shall comply with the specific Dubai Municipality Green Buildings Regulations (DMGBR) requirements listed below, however this list is not exhaustive and additional documentation will be required as per the final Dubai Municipality Green Buildings Regulations (DMGBR) requirements:

1. **<u>503 Commissioning and Management:</u>**
   - Comply with the commissioning plan under direction from the Commissioning Authority. Employ an independent commissioning contractor to commission installed systems and develop the Building Log Book. Submit commissioning program, commissioning method statements and commissioning results. Submit the Operation and Maintenance Manuals and all as built drawings prior to the completion of commissioning.
   - Provide as built drawings, updated narrative and commissioning results.
   - Prepare the Occupant Handbook, including maintenance requirements for the building's performance, specific measures to maintain the life of building materials, etc.

2. **<u>301 Access and Mobility [For Buildings Blocks only]</u>**

   - Provide Updated narrative with calculations showing the project meets the DMGBR Requirements, including numbers of bicycle parking spaces, where the parking is situated, type of stands and security arrangements, description of any cycle paths, showers and clothes lockers; As-built plans and/or drawings showing the location of the bicycle and shower facilities, distances from main building entrances, locations of signage and/or cycle paths, as appropriate; and Photographs of cycle parking spaces, changing facilities, clothes lockers and cycle lanes as appropriate.

3. **305 Responsible Construction**

- Provide records of environmental performance, site mobilization agreements, environmental monitoring, inspection and audit reports and close out reports, site demobilization agreement, etc.
- Provide Photographs and as built landscape drawings clearly indicating the planted species.
- Engage a 3rd party, Dubai Municipality Environment Department (DMED)-approved Class A Environmental Consultant to prepare a project specific Construction Environmental Management Plan (CEMP) prior to the start of construction. Implement and comply with approved CEMP. Provide ISO14001 certification.

4. **401 Ventilation and Air Quality [For Buildings Blocks only]**

- Install no-smoking signage as required. Provide as built drawings, photographic evidence and updated narrative.
- Review, update and comply with the Legionella Management Plan. Provide plant installation and commissioning, testing, training and competency and record keeping audit checklists. Integrate Legionella Management into the O&M Manuals. Provide narrative and as built drawings of air conditioning systems and all other water-based systems..
- Install CO2 monitoring and alert systems. Provide as built drawings, photographs, commissioning results and narratives.
- Comply with VOC limits as required. Provide an inventory (tracking sheet) of all adhesives and sealants and paints and coatings used on the project, signed by construction manager. Provide product data for adhesives and sealants and paints and coatings used inside the weatherproofing system indicating VOC content of each product used. Provide purchase receipts, MSDS and weight of all interior adhesives and sealants, and surface area of all interior painted surfaces by paint type.

Material Emissions – Adhesives & Sealants
Intent
Confirm the use of low emission adhesives and sealants to encourage the desirability of these spaces in relation to improved occupant health.
Relevance to Emaar South Development Plot GC04 Parkside2

Construction Required Submittals:

- ☐ Billing/purchase receipts for all interior adhesives and sealants used in the project;
- ☐ Tracking sheet, signed by the construction managers for receipt of all adhesives and sealants;
- ☐ Enter all compliant and non-compliant adhesives and sealants into the Adhesives and Sealants template, their VOC content, the allowable VOC content and the quantity used; and
- ☐ Material Safety Data Sheets and Technical Data Sheets for all interior adhesives and sealants.

Summary of Adhesives and Sealants

Are all adhesives and sealants within 50% of the SCAQMD VOC limits?	Yes
Total volume of all adhesives and sealants used in the development, liters	0
Volume of all adhesives and sealants that are within the SMAQMD VOC limits, liters	0
Percentage of adhesives and sealants that are within the VOC limits	**100%**

List of all Indoor Adhesives and Sealants used in the Development

Product Type	Product Name	Manufacturer	Volume, liters	SCAQMD VOC Limit, g/liter	Product VOC Content, g/liter	Source of VOC Data	Volume of Products that are within the VOC Limits, liters	Is the VOC Content within 50% of the SCAQMD Limit?
							0	
							0	
							0	
							0	

							0	
							0	
							0	
							0	

Material Emissions – Paints & Coating
Intent
Confirm the use of low emission Paints and Coatings to encourage the desirability of these spaces in relation to improved occupant health.

Relevance to Emaar South Development Plot GC04 Parkside2

Construction Required Submittals:
- Billing / purchase receipts for all interior paints and coatings used in the project;
- Tracking sheet, signed by the construction managers for receipt of all paints and coatings;
- Enter all compliant and non-compliant paints and coatings into the Paints and Coatings template, their VOC content, the allowable VOC content and the total quantity used; and
- Material Safety Data Sheets (MSDS) and Technical Data Sheets for all interior paints and coatings

Summary of Paints and Coatings

Are all paints and coatings within 50% of the EU Directive 2004/42/CE: 2004 VOC limits?	Yes
Total area of all paints and coatings used in the development, m^2	0
Area of all paints and coatings that are within the EU Directive 2004/42/CE: 2004 VOC limits, m^2	0
Percentage of paints and coatings that are within the VOC limits	**0%**

List of all Indoor Paints and Coatings used in the Development

Product Type	Product Name	Manufacturer	Area Covered by Paint/ Coating, m^2	EU Directive 2004/42/CE: 2004 VOC Limit, g/liter	Product VOC Content, g/liter	Source of VOC Data	Area of Products that are within the VOC Limits, m^2	Is the VOC Content within 50% of the SCAQMD Limit?
							0	Yes
							0	Yes
							0	Yes
							0	Yes
							0	
							0	
							0	
							0	
							0	
							0	
							0	
							0	
							0	
							0	
							0	
							0	
							0	
							0	

Carpet Systems Provide product data for carpets installed as part of the project. Confirm proposed carpet and carpet cushion meet the Carpet and Rug Institute Green Label Program. Confirm hard flooring or timber flooring complies with credit requirements. Provide narrative,

Material Emissions – Carpet & Hard Flooring
Intent
Confirm the use of low emission flooring systems to encourage the desirability of these spaces in relation to improved occupant health.

Relevance to Emaar South Development Plot GC04 Parkside2

Construction Required Submittals:
 Brief narrative (with submitted As-Built drawings as required) describing the locations of all carpets, carpet cushion, hard flooring products and finishes installed in the project. Enter all types of carpet, carpet cushion, hard flooring products and finishes installed in the project into the Carpet and Hard Flooring template. Confirm that all products comply with the requirements outlined. Also upload all associated Material Safety Data Sheets and Technical Data Sheets for these products to demonstrate compliance with the credit requirements.

List of all Carpets and Hard Flooring used in the Development

Product Type (Carpet, Hard Flooring or Wood Flooring)	Product Name	Manufacturer	Are the Credit Requirements met?	Source of Data

Ceiling Systems Comply with credit requirements for all ceiling systems. Provide product data to demonstrate suspended ceiling systems complies with BS EN13964:2004. Where no ceilings installed, the paint and/or sealants used are in compliance with DMGBR. Provide narrative, tracking sheet, purchase receipts, MSDS and technical data sheets.

Material Emissions – Ceiling Systems
Intent
Confirm the use of low emission ceiling systems to encourage the desirability of these spaces in relation to improved occupant health.

Relevance to Emaar South Development Plot GC04 Parkside2

Construction Required Submittals:
 Billing/purchase receipts for all aspects relating to the ceiling systems of the project;
 Tracking sheet, signed by the construction managers for receipt of all products requiring compliance with the requirements; and
 Material Safety Data Sheets and Technical Data Sheets for all products requiring compliance with the credit requirements.

List of all Ceiling Systems in the Development

Ceiling System	Product Name	Manufacturer	Are the Credit Requirements met?	Source of Data

Formaldehyde Reduction: Comply with credit requirements for formaldehyde content for construction materials and installed furniture. Provide as built finish schedule and furniture schedule listing materials that contain formaldehyde, MSDS, formaldehyde content tests, purchase receipts and narrative.

Material Emissions – Formaldehyde Reduction
Intent
Confirm the use of low emission ceiling systems to encourage the desirability of these spaces in relation to improved occupant health.

Relevance to Emaar South Development Plot GC04 Parkside2

Construction Required Submittals:
□ As Built interior finish schedule for all installed products highlighting products containing formaldehyde;
□ Schedule for all installed furniture highlighting products containing formaldehyde; and
□ For all products containing formaldehyde, provide either Manufacturer's Data sheets.
or
□ Third party evidence showing certification of formaldehyde content tested, according to appropriate testing standards (see reference standards) by one of the following:
- Reputable certified independent testing laboratory; or
- Certification from a reputable third party assessment body.

High Frequency Lighting: Provide as built drawings and schedules, product receipts, technical data sheets for all lighting systems and occupancy sensors, photographic evidence and narrative.
High Frequency Lighting
Intent
To promote indoor visual comfort through the use of high frequency lighting solutions.

Relevance to Emaar South Development Plot GC04 Parkside2

Construction Required Submittals:

Construction

Summary of Ballasts

Total number of ballasts	0
Number of high frequency ballasts	0
Percentage of high frequency ballasts	**0%**

Product Type	Product Name	Manufacturer	Quantity	High Frequency Ballast?

5. **501: Energy Conservation and Efficiency**
   - Provide data to input into the updated Energy model template. And calculate average area weighted U – Value for all buildings envelop, with required full supporting documentation.
   - Install monitoring system as required by the credit. Provide updated narrative, schematics, as built drawings, manufacturer's data, purchase receipts and photographic evidence.
   - Provide updated narrative, manufacturer's data and as built drawings.
   - Install energy efficient appliances that meet DMGBR requirements. Provide list of all installed appliances, purchase receipts, manufacturer's information and energy rating, and guidelines for tenant procurement of energy efficient appliances.
   - Install lifts compliant with the DMGBR requirements. Provide updated narrative, manufacturer's data, as built drawings,
   - Provide updated narrative and calculations, manufacturers information, commissioning results and as built documentation.

6. **601: Water Conservation and Efficiency**

   - Provide as built drawings, updated water fixtures schedule, purchase receipts, technical data for all fittings and fixtures indicating flow rates and flow regulation systems, water use data and pressure graphs, photographic evidence and narrative.
   - Install monitoring systems as required by the credit. Provide narrative, as built drawings, purchase receipts, manufacturer's data for all meters and the central monitoring system, and photographic evidence.
   - Provide as built documentation, photographic evidence and narrative with confirmation of calculations.
   - Provide as built drawings, updated calculations and schedules, photographic evidence and narrative.
   - Install monitoring systems and leak detection systems as required by DMGBR. Provide as built drawings, purchase receipts, manufacturer's data, photographic evidence and narrative.

7. 701: Material Conservation and Efficiency

- Confirm through procurement documentation and a materials schedule that no hazardous materials have been procured for the project.

Hazardous Materials Elimination
Intent
To eliminate exposure of building occupants to asbestos and minimize toxic effects of chromated copper arsenate (CCA) treated timber on people and the environment.

Relevance to Emaar South Development Plot GC04 Parkside2

Check List

Demonstrate that no Asbestos Containing Materials (ACMs) are used within the development and that all ACMs have been removed from refurbished buildings. This Credit Requirement builds on Cabinet Resolution No. 39 of 2006 Concerning Prohibiting Import, Production and Utilization of Asbestos Boards and extends the prohibition to all ACMs. Demonstrate that where timber is specified to treat external structures where there is frequent and intimate contact, such as –but not limited to- shading devices, playground equipment and handrails that no chromated copper arsenate (CCA)-treated timber is used on the project.
Narrative (Required):-

Evidence of purchase indicating that no ACMs or CCA-treated timber were used in the project as per the Credit Requirements.

Narrative (Optional):-
Please provide any additional comments or notes regarding special circumstances or considerations regarding the project's credit approach.

- Develop and implement a Construction and Demolition Waste Management Plan complying with Section 017419: "Construction Waste Management and Disposal." Divert a minimum of 80 - 70% of construction waste from landfill through reuse and recycling. Provide a waste tracking register agreed with Employers Representative and Employer, copies of collection receipts, disposal receipts, recycling receipts, and other evidence required to prove the diversion the target was met.

BASIC CONSTRUCTION WASTE MANAGEMENT: DIVERT 50% FROM DISPOSAL

Intent

To reduce the long-term environmental impacts associated with construction waste collection, transport and disposal. Divert construction, demolition and land-clearing debris from disposal in landfills and incinerators. Redirect recyclable recovered resources back to the manufacturing process. Redirect reusable materials to appropriate sites.

Relevance to Emaar South Development Plot GC04 Parkside2

Check List

Diverted Construction Waste Calculation: Provide diverted / recycled materials description, diversion / recycling hauler or location and quantity of diverted / recycled waste. Also provide Total Construction Waste Generated, Total Construction Waste Diverted and Total percentage of construction waste diverted from landfill.

(To qualify for the credit the project must recycle and / or salvage at least 50% of non-hazardous construction, demolition and land-clearing debris.)

Narrative (Required):-

Please describe the project's construction waste management approach and plan. Please provide any additional comments or notes regarding special circumstances or considerations regarding the project's credit approach.

Calculations:

The quantity delivered materials and means of diversion are explained in the table:

How & Where waste is diverted	Diverted Material Qty.
Scrap Steel – reworked & reused	……
Scrap Steel – sold to other sites	……
Timber Scrap – donated to other project site	……
Etc.	
Total Qty. of diverted waste	…..
Total Qty. of waste	…..
% of waste diverted	…..%

Waste Disposal:

Contractor:
Contact:

Name of landfill for disposal of non-recyclable waste:
- Transfer Stations:
- Landfills (ultimate disposal location):

Landfill tipping fee: $XX / ton
Estimate of waste for landfill disposal:

Recycling Calculation:

If all construction waste was disposed in landfill: XX lbs = XX tons x $XX/ton = **$XX**

With recycling: TOTAL = **$XX**

Diverted / Recycled Materials Description	Diversion / Recycling Hauler or Location	Quantity of Diverted / Recycled Waste	Units (tons / cy)
Concrete	ABC Recycling	138.0	Tons
Wood	Z-Construction Reuse	10.2	Tons
Gypsum Wallboard	ABC Recycling	6.3	Tons
Steel	Re-Cycle Steel Collectors	1.1	Tons
Crushed Asphalt	On-Site Reuse	98.2	Tons
Masonry	ABC Recycling	6.8	Tons
Cardboard	ABC Recycling	1.6	Tons
TOTAL CONSTRUCTION WASTE DIVERTED		262.2	Tons
Landfill Materials Description	**Landfill Hauler or Location**	**Quantity of Diverted / Recycled Waste**	**Units (tons / cy)**
General Mixed Waste	XYZ Landfill	52.3	Tons
TOTAL CONSTRUCTION WASTE SENT TO LANDFILL		**52.3**	**Tons**
TOTAL OF ALL CONSTRUCTION WASTE		**314.5**	**Tons**
PERCENTAGE OF CONSTRUCTION WASTE DIVERTED FROM LANDFILL		**83.4%**	

Enclosures:-

Basic Construction Waste Management	**Project Reference Number**	DU1841

IDPT Responsible Individuals	Signature	Role	Date	Revision

All below mentioned requirements to be attached when applicable

	Submission Requirements	Submitted	Document / Attachment	Approved		Comments Yes
				Yes	No	
54	Construction & Demolition Waste Management Plan (CDWMP) conforming to the Credit Requirements					
55	Building Waste Calculator confirming compliance with Credit Requirements					
56	Schedule of items to be recycled/salvaged (complete Design table below)					
	Required credit achieved?					

Other Supportive Documents:

Construction & Demolition Waste Management Plan (CDWMP) *

Construction & Demolition Waste Management Plan (CDWMP) Submitted?	Yes	○	No	○

Building Waste Calculator **

Building Waste Calculator output submitted?	Yes	○	No	○
Output complying with credit requirement?	Yes	○	No	○

recycled/salvaged Items Schedule

Item to be Recycled/Salvaged	Source within Project	Estimated Volume, m3	Potential Reclaim/Recycling Hauler Name or Location

Summary of Construction Waste to be Recycled/Salvaged

Measurement unit	
Estimated total construction waste arising from development	
Estimated construction waste to be recycled/salvaged	
Percentage of construction waste to be recycled/salvaged	%

**Attach Construction & Demolition Waste Management Plan (CDWMP)*
*** Attach Building Waste Calculator output*

- Provide as built drawings and photographs, and updated narrative with calculations.

- Identify each regional material, including its source, cost, and the fraction by weight that is considered regional. Product data for regional materials indicating location and distance from Site of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional. Provide purchase receipts, photographic evidence of installation, proof of manufacture and calculations of the percentage of regional materials cost from the total materials cost.

Regional Materials
Intent
To encourage the selection of building materials that have reduced transport impacts and promotes regional economies
Relevance to Emaar South Development Plot GC04 Parkside2
Construction Required Submittals:
 Updated report listing all nominated materials demonstrating compliance with the DMGBR Requirements, including:
- Final cost;
- Location(s) of extract/harvest/recovery/manufacture; and
- proof of manufacture detailing country of origin and port of entry, if applicable.
- For each nominated material, proof of manufacture detailing country of origin and port of entry, if applicable; and
- Evidence of purchase and installation of these materials in the project in the form of invoices from suppliers and installers.

Summary of Material Sources

Enter Total Material Cost, $	
Actual materials costs that comply with requirements of this credit, $	$0
Cost of regional materials as a percentage of the Total Material Cost	**0%**

Actual Costs of Regional Materials Used in the Development

Material Name	Cost, $	Location(s) of Material Extraction/ Harvest/Recovery/Manufacture	Distance Travelled from Point of Origin to Development Site, km	Means of Transport	Compliant Material Cost, $
					0
					0

- Provide product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating cost for each product having recycled content. Provide updated narrative, calculations, proof of manufacture, and proof of purchase.

Recycled Materials - Recycled Aggregates
Intent
To increase the demand for recycled materials to reduce the amount of waste going to disposal.
Relevance to Emaar South Development Plot GC04 Parkside2
Construction Required Submittals:
 Updated narrative listing all materials used to meet the DMGBR Requirements;
 Updated calculations by volume (Recycled Aggregates) or cost (Other materials) demonstrating compliance with the Credit Requirements;
 Proofs of manufacture for all nominated materials; and
 Proof of purchase for all nominated materials.

Recycled Aggregate

Aggregate Use	Manufacturer/Supplier	Total Volume of Aggregate, m^3	Volume of Recycled Aggregate and/or Aggregates from Industrial Waste By-products, m3	Percentage of recycled aggregate and/or aggregates from industrial waste by-products
				0%

Recycled Materials - Embodied GHG emissions (Cement Replacement)
Intent
To increase the demand for recycled materials to reduce the amount of waste going to disposal.
Relevance to Emaar South Development Plot GC04 Parkside2
Construction Required Submittals:
- Updated narrative listing all materials used to meet the Credit Requirements;
- Updated calculations for embodied GHG emissions
- Proofs of manufacture for all nominated materials; and
- Proof of purchase for all nominated materials.

Letter from the concerned party of receiving scrap on letter head.
Debit Note.

Contracting Company
(Letter Head)

To Whomsoever It May Concern

Project: Emaar South Development Plot GC04 Parkside2
Subject: BASIC CONSTRUCTION WASTE MANAGEMENT, DIVERT 50% FROM DISPOSAL **- Block work & Concrete Waste -**

This is to certify that broken blocks & concrete waste generated during construction of Company building have been reworked and used for other applications, such as, road basement at the same building project. The approximate quantity of broken blocks & concrete waste reused is around ……tones.

For *contracting company*

Authorized Signatory

Contracting Company
(Letter Head)

To Whomsoever It May Concern

Project: Emaar South Development Plot GC04 Parkside2
Subject: BASIC CONSTRUCTION WASTE MANAGEMENT, DIVERT 50% FROM DISPOSAL **-Steel Scrap -**

This is to certify that steel scrap generated during construction of Company building have been reworked and used for other applications, such as, steel reinforcement at the same building project. The approximate quantity of steel scrap reused is around ……tones.

For *contracting company*

Authorized Signatory

Contracting Company
(Letter Head)

To Whomsoever It May Concern

Project: Emaar South Development Plot GC04 Parkside2
Subject: BASIC CONSTRUCTION WASTE MANAGEMENT, DIVERT 50% FROM DISPOSAL **- Timber Scrap -**

This is to certify that timber scrap generated during construction of Company building have been received by us. The timber scrap is being used in our project… The approximate quantity of timber scrap received is around …tones.

For *contracting company*

Authorized Signatory

End of Chapter.

SECTION 01-7419

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

A. Emaar South Development Plot GC04 Parkside2 project is required to generate the least amount of trash and waste possible.

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible with a target construction waste diversion rate from landfills with a minimum of 50% required to achieve Dubai Municipality Green Buildings Regulations (DMGBR).

E. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:

1. Aluminum and plastic beverage containers.
2. Corrugated cardboard.
3. Wood pallets.
4. Clean dimensional wood: May be used as blocking or furring.
5. Land clearing debris, including brush, branches, logs, and stumps: See Section 31-1000 for use options.
6. Concrete: May be crushed and used as riprap, aggregate, sub-base material, or fill.
7. Bricks: May be used on project if whole, or crushed and used as landscape cover, sub-base material, or fill.
8. Concrete masonry units: May be used on project if whole, or crushed and used as sub-base material or fill.
9. Precast concrete panels: May be used for erosion control or landscape features.
10. Asphalt paving: May be recycled into paving for project.
11. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
12. Glass.
13. Gypsum drywall and plaster.
14. Plastic buckets.
15. Carpet, carpet cushion, carpet tile, and carpet remnants

16. Paint.

17. Plastic sheeting.

18. Rigid foam insulation.

19. Windows, doors, and door hardware.

20. Plumbing fixtures.

21. Mechanical and electrical equipment.

22. Fluorescent lamps (light bulbs).

23. Acoustical ceiling tile and panels.

F. Dubai Municipality Green Buildings Regulations (DMGBR) compliance for this project is dependent on diversion of minimum of **50 percent** of construction and demolition waste, by weight or volume, of potential landfill trash/waste by recycling and/or salvage.

G. Main Works Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, recycling, salvage and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.

H. Main Works Contractor shall develop and follow a Waste Management Plan designed to implement these requirements:-

I. Methods of trash/waste disposal that are not acceptable are:
1. Burning on the project site.
2. Burying on the project site.
3. Dumping or burying on other property, public or private.
4. Other illegal dumping or burying.
5. Incineration, either on- or off-site.

J. Regulatory Requirements: Main Works Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, emirate and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 RELATED SECTIONS

A. Annexure 1: Construction Waste Management Plan Guidelines

1.03 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

D. Non-hazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.04 SUBMITTALS

A. Section 01-6200 - DMGBR Requirements for submittal procedures.

B. Construction Waste Management Plan: Include the following information:

i. General: Develop and implement a CWMP consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Include separate sections in plan for demolition and construction waste. Indicate quantities by weight or volume, but use the same units of measure throughout the CWMP.

ii. Draft Construction Waste Management Plan: Within 30 days after receipt of Notice to Proceed, or prior to any waste removal, whichever occurs sooner, the Contractor shall submit to the Employer and Engineer a Draft Waste Management Plan.

iii. Final Construction Waste Management Plan: Once the Owner has determined which of the recycling options addressed in the draft Waste Management Plan are acceptable, the Contractor shall submit, within 10 calendar days, a Final Waste Management Plan.

iv. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

v. Landfill Options: Indicate the name of the landfill(s) and/or transfer station(s) and/or incinerator(s) where trash will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all Project waste in the landfill(s).

vi. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, reused, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

vii. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.

viii. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.

ix. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.

x. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.

xi. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.

xii. Handling and Transportation Procedures: Describe method that will be used for separating recyclable waste, including sizes of containers, container labeling, and designated location on Project Site where materials separation will be located.

xiii. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.

xiv. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).

xv. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.

xvi. List each material proposed to be salvaged, reused, or recycled.

xvii. List the local market for each material.

xviii. State the estimated net cost, versus landfill disposal.

xix. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.

xx. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.

xxi. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.

xxii. Recycling Incentives: Describe procedures required to obtain credits, rebates, or similar incentives.

A. Submit a 3-ring binder with calculations on end-of-project recycling rates, salvage rates, and landfill rates itemized by waste material, demonstrating that a minimum of 50% of construction wastes were recycled or salvaged and diverted from landfill. Include documentation of recovery rate (if commingled), waste hauling certificates or receipts, and a brief narrative explaining how and to where each waste type has been diverted.

B. Construction Waste Management Plan: Submit four copies of plan within 45 days of date established for the Notice to Proceed.

C. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit four copies of report. Include separate reports for demolition and construction waste. Include the following information:

i. Material category

ii. Generation point of waste

iii. Total quantity of waste in tons

iv. Quantity of waste salvaged, both estimated and actual in tons

v. Quantity of waste recycled, both estimated and actual in tons

vi. Total quantity of waste recovered (salvaged plus recycled) in tons

vii. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste

viii. Include up-to-date records of donations, sales, recycling and landfill/incinerator manifests, weight tickets, hauling receipts, and invoices.

D. Waste Reduction Calculations: Before request for Substantial Completion, submit four copies of calculated end-of-project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work. Complete a table similar to the example below.

Recycled/Salvaged/Diverted Materials	Hauler or Location	Quantity of Material (tons)
Total Construction Waste Diverted		
Landfilled Materials		
Total Construction Waste Landfilled		

Total Construction Waste		Total Construction Waste Diverted + Total Construction Waste Landfilled
Percentage of Construction Waste Diverted from Landfill		(Total Construction Waste Diverted / Total Construction Waste)*100

E. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax-exempt.

F. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax-exempt.

G. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

H. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills (or transfer stations) and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

I. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.

J. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.

K. Landfill Disposal: Include the following information:-

i. Identification of material.

ii. Amount, in cubic meters (tons or cubic yards), of trash/waste material from the project disposed of in landfills.

iii. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.

iv. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.

L. Recycled and Salvaged Materials: Include the following information for each:

i. Identification of material, including those retrieved by installer for use on other projects.

ii. Amount, in cubic meters (tons or cubic meter), date removed from the project site, and receiving party.

iii. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.

iv. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.

v. Certification by receiving party that material will not be disposed of in landfills or by incineration.

M. Material Reused on Project: Include the following information for each:

i. Identification of material and how it was used in the project.

ii. Amount, in cubic meters (tons or cubic yards).

iii. Include weight tickets as evidence of quantity.

N. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with all applicable local Authorities regulations Construction Law(s) and Development Manual for construction.

B. Waste Management Meetings: Conduct an initial conference at Project Site to comply with requirements in Section 01: GENERAL. Contractor shall include discussions on construction waste management requirements in the preconstruction meeting. Contractor shall include discussions on construction waste management requirements in the regular job meetings conducted during the course of the Project; at these meetings, review methods and procedures related to waste management including, but not limited to, the following:

i. Review and discuss waste management plan including responsibilities of the Waste Management Coordinator.

ii. Review requirements for documenting quantities of each type of waste and its disposition.

iii. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.

iv. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.

v. Review waste management requirements for each trade.

PART 2 - PRODUCTS

2.01 PRODUCT SUBSTITUTIONS

A. For each proposed product substitution, submit the following information in addition to requirements specified in Section 01-6100:

1. Relative amount of waste produced, compared to specified product.

2. Cost savings on waste disposal, compared to specified product, to be deducted from the Contract Sum.

3. Proposed disposal method for waste product.

4. Markets for recycled waste product.

PART 3 - EXECUTION

3.01 WASTE MANAGEMENT PROCEDURES

A. See Section 01-6200 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. See Annexure 1: Construction Waste management Plan Guidelines.

3.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor and Architect.

C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

D. Meetings: Discuss trash/waste management goals and issues at project meetings.

1. Pre-bid meeting.
2. Pre-construction meeting.
3. Regular job-site meetings.

E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all Contractors and installers.

1. As a minimum, provide:-

   a. Separate area for storage of materials to be reused on-site, such as wood cut-offs for blocking.
   b. Separate dumpsters for each category of recyclable.
   c. Recycling bins at worker lunch area.

2. Provide containers as required.

3. Provide temporary enclosures around piles of separated materials to be recycled or salvaged.

4. Provide materials for barriers and enclosures that are non hazardous, recyclable, or reusable to the maximum extent possible; reuse project construction waste materials if possible.

5. Locate enclosures out of the way of construction traffic.

6. Provide adequate space for pick-up and delivery and convenience to sub-contractors.

7. If an enclosed area is not provided, clearly lay out and label a specific area on-site.

8. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

F. Hazardous Wastes: Separate, store and dispose of hazardous wastes according to applicable regulations.

G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize re-cyclability of identified materials.

Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse:-

I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

3.03 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

i. General: Recycle paper and beverage containers used by on-site workers.

ii. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include, but are not limited to, the following:

1. List to be developed by Contractor.

2. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project Site to the maximum extent practical.

iii. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project Site. Include list of acceptable and unacceptable materials at each container and bin. Inspect containers and bins for contamination and remove contaminated materials if found.

iv. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

v. Stockpile materials away from construction area. Do not store within drip line of remaining trees.

vi. Store components off the ground and protect from the weather.

vii. Remove recyclable waste off Employer property and transport to recycling receiver or processor.

3.04 RECYCLING CONSTRUCTION WASTE

i. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.

2. Polystyrene Packaging: Separate and bag materials.

3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project Site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.

4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

ii. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into material appropriate for mulch or erosion control.

2. Lumber Treated with Heavy-Metal Preservatives: Do not grind, chip, or incinerate; must be reused or landfilled.

iii. Miscellaneous: Anything called out to be ground and used on site should utilize an on-site grinder.

1. Grinder should be able to accommodate a variety of materials including masonry, asphalt shingles, wood, and drywall.

3.05 DISPOSAL OF WASTE

iv. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project Site and legally dispose of them in a landfill or incinerator acceptable to UA.E. Authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of to accumulate on site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

3. Do not burn or bury waste materials on or off site. Appropriate on-site topical application of ground gypsum or wood, or use of site paving as granulated fill is considered reuse, not waste.

End Of Section 01-7419.

EMAAR SOUTH DEVELOPMENT PLOT GC04 PARKSIDE2
DUBAI

ANNEXURE 1

SUSTAINABLE JOB SITE OPERATIONS
CONSTRUCTION WASTE MANAGEMENT PLAN

Overview

Emaar South Development Plot GC04 Parkside2 project will implement a construction waste management plan to meet the requirements of Dubai Municipality Green Buildings Regulations (DMGBR). Specifically, this project seeks to reduce construction landfill waste by minimum of **50%** of construction & demolition waste (by weight or volume) excluding hazardous waste that must undergo specialized treatment. The inevitable waste that is generated during each of these stages will be reused, salvaged, or recycled through local and regional companies, organizations, and partners.

Main Contractor is responsible to deploy the processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors shall be employed.
The subcontractor will make a good faith effort to reduce the amount of waste generated on the job-site and recycle material as per the contractor's Waste Management Plan. The subcontractor will follow the designated handling procedures for each type of waste generated on-site and provide documentation to verify material reuse, recycling, and disposal as indicated in the waste management plan.

Contents

Definitions

a. Construction, Demolition, and Land clearing (CDL) Waste:
Includes all non-hazardous solid wastes resulting from construction, remodeling, alterations, repair, demolition and land clearing.

b. Salvage:
Recovery of materials for on-site reuse or donation to a third party. (i.e. a door as a door, a window as a window, etc).

c. Reuse:
Making use of a material without altering its form. Materials can be reused on-site or reused on other projects off-site. Examples include, but are not limited to the following: Grinding of concrete for use as a sub-base material. (i.e. wood chipped for mulch, concrete crushed for sub-base or aggregate).

d. Recycling:
The process of sorting, cleaning, treating, and reconstituting materials for the purpose of using the material in the manufacture of a new product.

e. Source-Separated CDL Recycling:
The process of separating recyclable materials in separate containers as they are generated on the job-site. The separated materials are hauled directly to a recycling facility or transfer station.

f. Co-mingled CDL Recycling:
The process of collecting mixed recyclable materials in one container onsite. The container is taken to a material recovery facility where materials are separated for recycling.

Requirements

1. General: Divert a minimum of 70 to 50% CDL waste, by volume or weight (as applicable), from the landfill by one, or a combination of the following activities:

    a. Salvage
    b. Reuse
    c. Source-Separated CDL Recycling
    d. Co-mingled CDL Recycling

It should be realized that this is not a complete list of materials that can be salvaged, reused or recycled. Every effort should be made to explore the possibility of salvaging, reusing or recycling other items that are not listed below.

2. CDL waste materials that can be salvaged, reused or recycled include, but are not limited to, the following:

    a. Acoustical ceiling tiles
    b. Asphalt
    c. Asphalt shingles
    d. Bricks
    e. Cardboard and plastic packaging
    f. Carpet and carpet pad
    g. Concrete
    h. Concrete Masonry Units (CMU)
    i. Dirt/Soil

j. Drywall
k. Land clearing debris (vegetation, stumpage) – *note: soil is not included*
l. Metals from banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
m. Clean dimensional wood
n. Field office waste, including office paper and cardboard, aluminum cans, glass, and plastics
o. Plywood, OSB, & particle board

Other Items for consideration:

p. Batteries
q. Paint, adhesives, caulk, etc. (through hazardous waste outlets)
r. Gypsum wallboard
s. Fluorescent lights and ballasts
t. High density polyethylene (HDPE)
u. Plastic film (sheeting, shrink wrap, packaging)
v. Polystyrene
w. Rigid foam insulation
x. Window glass

All items will be salvaged, reused or recycled in a phased method. ***Please refer to the Construction and Demolition Recycling Providers in Appendix A for recycle haulers in UAE& region.***

Implementation

1. Inspect site and determine proper placement for on site dumpsters and salvaged materials.

2. Place recycling and trash containers close to the point of waste generation and near each other so trash is not thrown in the recycling and vice versa. Clearly label the containers.

3. Designate a Recycling Coordinator (or Recycling Management Team) whose job is to effectively monitor the recycling program. Duties include:

   a. Continual communication to everyone on the project about Waste Management Plan.

   b. Post signs and written information about the recycling program. Create a map that shows placement of recycling containers and label the contents of each container.

   c. Regularly check wastes in the trash containers to see if recyclables are being thrown away or if materials that cannot be recycled are in recycling containers.

   d. Call recycling and waste haulers before containers are full and arrange pickup.

   e. Report updates of above recycling points at each safety or construction meeting.

4. Analyze local markets and determine final destination for material reuse and waste recycling. *Review the guide in Appendix A for recycling providers in the UAE & region.*

5. Use the provided Construction Waste Management Field Log to monitor quantities of recycled materials on an on-going basis.

6. Transport CDL waste materials off Employer property and legally dispose of them. See Appendix A for appropriate materials recycling and disposal.

7. Source separation for materials:

    a. Separate, store, protect, and handle at the site identified recyclable and salvageable waste products in order to prevent contamination of materials and to maximize recyclables and salvage-ability of identified materials.

    b. Provide containers, clearly labeled, by type of separated materials or provide other storage method for managing recyclable materials until they are removed from Project site.

    c. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

    d. Stockpile materials away from demolition area.

    e. Store components off the ground and protect from weather.

    f. Set aside and protect incorrectly delivered and substandard products and materials and return to supplier for credit.

8. Recycling:

    a. The Recycling Coordinator is to arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

    b. Include recycling discussions and updates from the Recycling Coordinator with all key personnel, including the project foreman and clean up crews at safety meetings.

    c. Specify that all drawings be ordered as black line drawings on white paper instead of blue line drawings so they can be recycled.

    d. Containers will have lids (when possible) to discourage contamination by the public. Lids are to be closed by last on site sub-contractor prior to leaving the job site.

9. Discuss the following points with all subcontractors:

    a. Expected quantities of waste for each trade and material used on the project and complete a Project Waste Analysis Worksheet.

    b. Recycling requirements and how to minimize waste at all preconstruction meetings.

    c. Importance of recycling and report results of efforts at all meetings.

    d. Waste prevention and recycling activities will be discussed at the beginning of each safety meeting.

    e. As each new subcontractor comes on-site, the Recycling Coordinator will present him/her with a copy of this Waste Management Plan and provide a tour of the recycling areas.

    f. The subcontractor will be expected to make sure all their crews comply with this Waste Management Plan.

    Subcontractors and/or crew who contaminate a recycling container will be responsible for separating out the contaminants themselves.

    g. All recycling containers will be clearly labeled.

    h. Lists of acceptable/unacceptable materials will be posted throughout the site.

i. Select products and materials with minimal or no packaging, if possible. Request that vendors reduce their packaging when possible.

j. Purchase materials in the sizes needed, rather than cutting materials to size.

Quality Assurance

1. Regulatory Requirements: Conduct construction & demolition waste management activities in accordance with Dubai Municipality Law and Regulations and all other applicable laws and ordinances if they apply.

2. Preconstruction Conference: Schedule and conduct meeting on-site prior to construction activities.

3. Attendees: Inform the following individuals, whose presence is required, of date and time of meeting.

   a. Employer (optional)
   b. Engineer
   c. Contractor's superintendent
   d. Major subcontractors
   e. Other concerned parties

4. Agenda Items: Review methods and procedures related to waste management including, but not limited to, the following:

   a. Review and discuss waste management plan including responsibilities of the Recycling Coordinator.

   b. Review requirements for documenting quantities of each type of waste and its disposition.

   c. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.

   d. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.

   e. Review waste management requirements for each trade.

   f. Receive updates from the Recycling Coordinator on recycling and waste disposal.

   g. Review the guide in Appendix A for recycling providers in the Dubai area.

5. Meeting Minutes: Record minutes for each meeting and distribute to all participants within 3 days.

Appendix A
Construction and Demolition Recycling and Waste Providers
Page 8

Appendix B
Construction and Demolition Waste Management Field Log
Page 11

Appendix C
DMGBR Construction and Demolition Waste Management Fact Sheet and Compliance Requirements
Page 13

APPENDIX A

Construction and Demolition Recycling Providers

Company: <CONTRACTOR>
Project: Emaar South Development Plot GC04 Parkside2

Designated Recycling Coordinator:

Waste Management Goal:
This project will generate the least amount of waste possible by a minimum of 50% of construction & demolition waste (by weight or volume) excluding hazardous waste that must undergo specialized treatment.

Communication Plan:
- Schedule and conduct a preconstruction/ demolition meeting on-site prior to demolition activities.
- Waste prevention and recycling activities will be discussed at the beginning of each meeting.
- As each new subcontractor comes on-site, the Recycling Coordinator will present him/her with a copy of this Waste Management Plan and provide a tour of the recycling areas.
- The subcontractor will be expected to make sure all their crews comply with this Waste Management Plan.
- All recycling container will be clearly labeled.
- Lists of acceptable/unacceptable materials will be posted throughout the site.

Expected Project Waste, Handling, and Disposal Log
The following charts identify waste materials expected on this project, their disposal method, and handling procedures.

APPENDIX A

Construction Phase

Material	Quantity	Disposal Method	Disposal Company	Handling Method
Concrete/CMUs		Recycle	TBD by Contractor	Break up any waste or mistakes and place in provided concrete container. Rebar okay.
Forming boards		Reuse/ Recycle	TBD by Contractor	Stack next to supply of forms for reuse. Recycle clean forms or return to subcontractor for reuse.
All clean wood scrap (non-treated plywood, particle board, OSB, etc.)		Reuse/ Recycle	TBD by Contractor	Stack reusable pieces next to saw. Place all unusable clean wood in hauler provided container.
Non-treated pallets, plywood, OSB, etc.		Recycle	TBD by Contractor	Hauler to provide container.
Drywall		Recycle	TBD by Contractor	Hauler to provide container for all sheeting material.

Dirt, vegetation, stumps, organic matter		Recycle	TBD by Contractor	Hauler to provide container(s) for all organic matter. Dirt will be weighed separately from vegetation.
Scrap metal		Recycle	TBD by Contractor	Hauler to provide container for all metals.
Batteries		Recycle	TBD by Contractor	GC/Hauler to provide container for all hazardous waste.
Adhesives, sealants, caulk, paint, etc.		Recycle	TBD by Contractor	GC/Hauler to provide container for all hazardous materials. Put smaller canisters in larger container (5-55 gal) for pickup upon construction completion.
Cardboard		Recycle	TBD by Contractor	GC to provide container for all cardboard.
Office waste: plastic, glass, paper		Recycle	TBD by Contractor	Hauler to provide containers
Plastic packaging (stretch, bubble, clear sheet plastic), cardboard, office paper, plastic, HDPE		Recycle	TBD by Contractor	GC/Hauler to provide container
Styrofoam (edge/corner packaging and peanuts only)		Reuse	TBD by Contractor	Hauler to provide container.
All other wastes		Landfill	TBD by Contractor	Trash dumpster

NOTES:
Recyclable materials taken to Recycling Plant locations will need a receipt of weight or volume of materials being received. Diversion may include donations to charitable organizations.

RECYCLING COMPANIES IN UAE :

COMPANY NAME & CONTACT NUMBERS

NATIONAL PROJECTS HOLDING CO. Marzouk Tower, 9th floor, Qibla, Kuwait. Tel. +965 247 6601 Fax. +965 247 6602 e-mail: info@nationalprojects.com.kw website: www.nationalprojects.com.kw	**PAPER & CARTON/SCRAP** Union Paper Mills Sales And Marketing & Corporate Office Address K. Deva Rao General Manager (Sales & Marketing) P.O. Box 41, Salahuddin Street, Abu Dhabi - UAE Tel: +971 4 2666300, Fax: +971 4 2667454 E-mail: gmsales@upm.ae
LUCKY CORP Abu Dhabi Box: 5328 Tel: 04-2637700 Fax: 04-2630840 E-mail: lco@lucky.co.ae **LUCKY RECYCLING CO LLC** Abu Dhabi Box: 5328 Tel: 04-2679777 Fax: 04-2678020 E-mail: lrcommercial@lucky.ae **LUCKY RECYCLING LTD.** International Private company Abu Dhabi , United Arab Emirates Jebel Ali Box: 16850 Tel: 04-8835250 Fax: 04-8835959 E-mail: lrl@lucky.co.ae	**RAW MATERIAL PROCUREMENT DIVISION** J. Subramanyam Manager (Raw Material Procurement) P.O. Box 41, Al Quoz Industrial Area No. 3, Abu Dhabi - UAE Tel: +971 4 3393937, Fax: +971 4 3393963 E-mail: j.subramanyam@upm.ae FACTORY ADDRESS AND CONTACTS: V. K. Venkataraman General Manager P.O. Box 41, Al Quoz Industrial Area No. 3, Abu Dhabi - UAE Tel.: +971 4 339 3339, Fax: +971 4 339 3931, E-mail: upm@emirates.net.ae, gm@upm.ae
CLEAN EARTH EST Abu Dhabi Box: 24244 Tel: 04-3555535 Ahmed Plastic (Re-Cycling) Ajman Box: 3709 Tel: 06-7432229 Fax: 06-7435070 E-mail: yasserabad@hotmail.com	**PAPER CHASE INTL INC** Jebel Ali Box: 17651 Tel: 04-8871333 Fax: 04-8871307 E-mail: pci@papchase.com Website: www.papchase.com Sharjah Box: 19879 Tel: 06-5342944 Fax: 06-5343051
AL JUMAIRA METAL SMELTER (LLC) Ajman Box: 3307 Tel: 06-7436908 Fax: 06-7433426 E-mail: jumetals@emirates.net.ae	**AL JUMAIRA METAL SMELTER (LLC)** Ajman Box: 3307 Tel: 06-7436908 Fax: 06-7433426 E-mail: jumetals@emirates.net.ae
B I G CABLE CONVERTING FZC Ajman Box: 932 Tel: 06-7407748 Fax: 06-7407746 E-mail: big@emirates.net.ae	**GREENTEC** Abu Dhabi Box: 20954 Tel: 04-2682578 Fax: 04-2684796 E-mail: greentec@emirates.net.ae
EMIRATES RECYCLING LLC Sharjah Box: 23235 Tel: 06-5344949 Fax: 06-5344994 E-mail: erlmetal@emirates.net.ae	**HIGH GULF POLYMER INDUSTRIES LLC** Sharjah Box: 29768 Tel: 06-5345573 Fax: 06-5346178

ISTANBUL ALUMINIUM & STEEL SCRAP TRDG LLC Sharjah Box: 27634 Tel: 06-5342067 Fax: 06-5342938		**MATCO TRADING LLC** Abu Dhabi Box: 117987 Tel: 04-2279755 Fax: 04-2292583
SCRAPMOULD INTL CORP LTD Jebel Ali Box: 16763 Tel: 04-8835437 Fax: 04-8835287 E-mail: smijali@emirates.net.ae		**CONTRIBUTION NON FERROUS METAL TRDG CO LLC** Abu Dhabi Box: 32253 Tel: 04-2243085 Fax: 04-2243083 E-mail: contribu@emirates.net.ae
UNIQUE METAL TECHNOLOGIES FZCO Jebel Ali Box: 121646 Tel: 04-8873393 Fax: 04-8873342 E-mail: umt@eim.ae Website: www.umt-uae.ae		**UNITED METALS IND CO LTD** Sharjah Box: 40491 Tel: 06-5323391 Fax: 06-5339408 E-mail: sharif@emirates.net.ae Website: www.sharifmetals.com
WU ZHOU GEN TRDG (LLC) Abu Dhabi Box: 41308 Tel: 04-2282038 Fax: 04-2279418 E-mail: fyhsl@yahoo.com Website: www.flol.com		**ECO PLASTIC INDUSTRIES** P.O. Box : 3773, ABU DHABI ,UAE Tel : +971-4-8801167, Fax : +971-4-8801165 Email : info@eco.ae
ZENATH PAPER TRADERS **P O Box No.7113, Abu Dhabi , UAE** Tel: 00 971 4 2713006; Fax: 00 971 4 2713003 E-mail: zenath@eta-ascon.com Contact Person: Mr. J.S.A.Bukhari, General Manager / Mr. H.M.Thameem Nassar, Deputy General Manager Head Office Abu Dhabi , U.A.E. P.O. BOX: 28427, Abu Dhabi , UAE Tel: +971-4-2286373, Fax: +971-4-2271837 Office location: Office no. 306, B 62, Maktom Street, ABU DHABI , U.A.E. Abu Dhabi, U.A.E. P.O.BOX: 33672, Abu Dhabi, UAE TEL: +971-2-6764005, FAX: +971-2-6764106 Office Location: Salam Street, Abu Dhabi, U.A.E.		

RECYCLING CENTERS IN ABU DHABI :

Public Recycling Centres:

Hamriya Shopping center
Rashidiya Shopping center
Mardif recycling center
Karama Fish market
Al Safa recycling center
Jebel Ali village recycling center
Muhaisna recycling center
Al Tower DM accommodation (Ghusais)
Private recycling centres
Spinneys Supermarket (Jumeriah, Karama, Umm Suqueim)
Holiday Inn Crowne Plaza (Satwa)
Abu Dhabi International School (Nad Al Sheba)
Abu Dhabi Duty Free (Rashidiya)
Abu Dhabi Modern School
EPPCO (Al Wasl Road)
Taj Palace Hotel (Al Rigga)
Reverse vending machines: Chicago Beach (Jumeirah Beach road)
Al Wasl (near Grand lube station)
Al Safa (Al Wasl Road)
Lamtara (Sk. Zayed Road near Safestway Supermarket)
Dhiyafa (Satwa)

Princeton Hotel (Garhood)
Radisson Hotel (Jumeirah)
Abu Dhabi Men's college (Hor Al Anz)
Al Bustan Rotana (Garhood)
Union Co-operative Society (Jumeirah)
Choitram Supermarket (Jumeirah)
Abu Dhabi National School (Satwa)
Sheikh Zayed University (Al Ghusais)
Alliance Insurance (Hor Al Anz)
Rajhan (Trade Center Road)
Al Adhed (Near Port Rashid)
Al Bustan (Near Aviation Club)
Madares (Opposite entrance to festival city)
Nad Al Hammer, Narhawan (behind Abu Dhabi airport)
Wejdan (Near Al Qusais Police Station).
Oasis Beach Hotel (Jumeriah)

APPENDIX B

<Project Name & Plot Number> WASTE MANAGEMENT FIELD LOG				
Material Category	**Solid Waste Landfill**	**Recycled**	**Salvaged**	**Reused**
Demolition				
Asphalt				
Foundation				
Concrete (cu yds)				
Structural				
Envelope				
Finishes				
Total (In volume or weight Equiv.)				
Percentage of Waste Diverted				

APPENDIX B

<Project Name & Plot Number>
PROJECT WASTE ANALYSIS WORKSHEET

Material	Quantity (est.)	Recyclable? Reusable?	Destination/ End User	Recycling Method

APPENDIX C

Construction Waste Management Fact Sheet
DMGBR

This fact sheet provides information for <Name of Recycling Company>, Dubai area contractors in achieving DMGBR waste management goals for Emaar South Development Plot GC04 Parkside2

DMGBR Materials and Resources: Construction Waste Management

The intent of this credit is to

- divert construction, demolition, and land clearing (CDL) debris from landfill disposal;
- redirect recyclable recovered materials back to the manufacturing process;
- redirect reusable materials to appropriate sites.

Develop and implement an effective construction waste management that quantifies material diversion goals. Calculations can be done by weight or volume, but must be consistent throughout.

DMGBR Documentation Requirements

Each credit a project attempts applying DMGBR requires documentation to prove the activity was completed to specific standards. The general contractor is normally responsible for waste management and is responsible for the submittal of the required documentation using the DMGBR Letter Template.

Documentation submittal is as follows:

- Complete the construction waste calculation tables in the Submittal Template with the following information:
  - General description of each type/category of generated waste
  - Location of receiving agent/recycler/landfill for waste
  - Quantity of waste diverted (by category) in tons or cubic yards

  This information can be obtained from the Construction and Demolition Debris Tracking Log in Appendix A.

- Provide a narrative describing the project's construction waste management approach. Narrative should include the project Construction Waste Management Plan and any additional comments or notes to describe special circumstances or considerations regarding the project's credit approach.

APPENDIX C

DMGBR™ Compliance

1. Use the provided Waste Management Field Log and spreadsheet to track the weights or volumes of construction, demolition, and land-clearing wastes that are both recycled and land filled.

2. Calculations can be done by weight or volume, **but must be consistent throughout**.

3. Hazardous waste and excavated soil are excluded from calculations.

4. Projects that crush and reuse existing concrete, asphalt, or masonry on-site should include these materials in the calculation.

5. Use the following equation to determine the recycling rate for the project:

$$\text{Recycling Rate [\%]} = \frac{\text{Recycled Waste}}{\text{Recycled Waste + Garbage}}$$

6. If using the **volume** method of calculation, use the solid waste conversion factors listed below to determine the proper density (numbers listed in lbs/cubic yard):

Rubble	1,400
Steel	1,000
Gypsum Wallboard	500
Mixed Waste	350
Wood	300
Cardboard	100

7. Refer to Table 3 (page 174) of the DMGBR™ Rating method, Version 1.0, for an example of this process.

Waste Management Report

1. Waste Management Report: Submit a cumulative waste management report with each Application for Payment with the following attachments:

   a. A record of the type and quantity, by weight, of each material salvaged, reused, recycled or disposed.

   b. Total quantity of waste recycled as a percentage of total waste.

   c. Disposal Receipts: Copy of receipts issued by a disposal facility for CDL waste that is disposed in a landfill.

   d. Recycling Receipts: Copy of receipts issued by an approved recycling facility.
      - For co-mingled materials, include weight tickets from the recycling hauler or material recovery facility and verification of the recycling rate for co-mingled loads at the facility.

   e. Salvaged Materials Documentation: Types and quantities, by weight, for materials salvaged for reuse on site, sold or donated to a third party.

End of Annexure 1.

Emaar South Development Plot GC04 Parkside2 – Dubai, U.A.E.

ANNEXURE 2

SUSTAINABLE JOB SITE OPERATIONS
INDOOR AIR QUALITY CONSTRUCTION PLAN AND IMPLEMENTATION PROCEDURES

Following the information in this plan and implementation procedures will assist in creating a healthy environment for all individuals involved in the construction process and to prevent residual problems with indoor air quality in the completed building of the new Emaar South Development Plot GC04 Parkside2. The material in this document is modeled after the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) Indoor Air Quality (IAQ) Guidelines for Occupied Buildings under Construction, 1995 and the Dubai Municipality Green Buildings Regulations (DMGBR).

Overview

All members of the project team will have defined responsibilities regarding IAQ. The role of the IAQ Coordinator can be assigned to the project manager, construction supervisor, inspector, safety officer, or tenant representative. Periodic team meetings should be scheduled to include specific consideration of IAQ issues. Workers from each trade will be given a briefing on what measures are being taken to protect IAQ and how these measures will be enforced. The superintendent will have a complete knowledge of containment procedures and other specific controls as well as back-up contingency plans to be implemented in the event of a failure. They are responsible for having their workers effectively implement the IAQ plan. Be sure to conduct regular inspection and maintenance of indoor air quality measures including ventilation system protection, and ventilation rate.

Contents

Requirements

Step One. Identify all potential sources of odor and dust. This includes all aspects of the job, from initial site preparation to final punch list. Pollutant sources may originate with each of the following:

a. Any product that creates odor or dust during the construction or clean-up process.
Read and follow container precautions, especially for products marked "use adequate ventilation" or "use only outdoors or in a well ventilated space."

b. Any equipment that will produce combustion products or other detectable emissions.

c. Odor or dust which results from the disruption of existing systems (e.g., sewer gas, discharge of particulates from ductwork).

d. Waste materials that are being transported or stored.

Step Two. Classify potential IAQ problems by severity. To simplify evaluation, related sources can be combined (e.g., the application of various paints and glues may present similar odor control issues unless

one work area is close to particularly sensitive occupants). Worst-case scenarios are generally assumed when evaluating potential hazards (controls will then be effective for the full range of operating conditions). Based on available information, odor and dust sources can be classified in one of three categories:

Class 1: These are air pollutants expected to have only a nuisance impact on exposed occupants. Health effects should only occur in the case of very sensitive individuals. An example is a small-scale wall relocation that will produce only small amounts of dust that contain no recognized hazards such as asbestos, lead, etc.

Class 2: These are air pollutants that cause a moderate but temporary health impact in some occupants. An example is dust and odor from the removal and replacement of carpet or demolition of multiple walls and ceilings.

Class 3: These are more hazardous air pollutants that cause severe, acute, or chronic illness. Examples include disturbance of products of combustion, asbestos fibers, heating of roof tar, application of enamel paint, mixing of epoxy resins, and non-vented operation of gasoline or diesel powered equipment.

Step Three. Identify available control options. Measures selected will help to minimize the release of dust and odor. The stringency of control required is based on the above hazard classifications (tightest control needed for Class 3, etc.). All available controls will be considered for planning purposes, including:

- Protection of HVAC systems
- Substitution of lower emitting products
- Modification of equipment for lower emissions
- Local exhaust or air cleaning
- Covering or sealing emissions
- Erecting barriers
- Protection of Absorptive materials
- Relocating sources
- Temporarily sealing off outside sources
- Dust suppression
- Increasing cleaning frequency or efficiency
- Vacating buffer zone around work sites
- Moving hypersensitive individuals.

Step Four. Select specific control measures. These will be sufficient to meet the project IAQ objectives in keeping with the degree of hazard involved (minimal controls for Class 1, moderate for Class 2, etc.). IAQ controls must be compatible with the project budget and facility operational requirements. Final selection should be based on the most efficient approach that will adequately protect the occupants. In some cases, the size or location of work areas will need to be modified for optimum environmental controls.

Site protection specifications included in this section will be coordinated with the following sections of the Project including:

- Construction Waste Management Plan
- Materials Selection

Implementation

General - Be sure to meet the minimum requirements of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction, 1995. Use safety meetings, signage, and subcontractor agreements to communicate the goals of the Indoor Air Quality Construction Plan.

Building's occupant and systems must be protected from airborne contaminants which are generated or spread during construction or renovation inside the buildings. Including toxic substances or substances harmful to the human body, such as asbestos, lead, pesticides, heavy metals, mold, dust, fumes, paint,etc.

Unless it is required to provide ventilation during construction, the supply and return heating, ventilation, and air conditioning (HVAC) system openings must be closed and protected from contamination. All ducts and other related air distribution component openings must be covered with tape, plastic, sheet metal or other methods to prevent dust or debris from collecting in the system.

If the HVAC system is used during construction or renovation, temporary return air filters must be installed with a Minimum Efficiency Reporting Value (MERV) in accordance with ASHRAE Standard 52.2-2007 or an equivalent standard.

Immediately prior to occupancy, the temporary return air filters must be removed and replaced with permanent filters having Minimum Efficiency Reporting Value (MERV) in accordance with ASHRAE Standard 52.2-2007 or an equivalent standard.

HVAC Protection - Shut down the return side of the HVAC system (which is, by definition, ductwork under negative pressure) during heavy construction or demolition. The return side should also be isolated from the surrounding environment. For example, all ceiling tiles for the ceiling plenum should be in place and all leaks in ducts and air handlers will be repaired promptly. If the ventilation system must be operated during construction, it will be fitted with temporary filters (minimum MERV 8) that will be replaced with clean media (Minimum MERV 13) just prior to completion and occupancy. The return side of the HVAC system will be dampered off in the heaviest work areas and return system openings will be sealed with plastic. Upgraded filter efficiency is recommended where major loading is expected.

Source Control - Specify finish materials (such as paints, carpet, composite wood, adhesives, and sealants) have low toxicity levels, or none at all. Low toxic materials selection is covered under Indoor Environmental Quality (IEQ) Credit 4. The project architect will identify materials that are potentially noxious, and control measures specified (options as described in the SMACNA guidelines). During installation of carpet, paints, furnishings, and other VOC-emitting products, provide supplemental (spot) ventilation for at least 72 hours after work is completed. *See Appendix A for Materials VOC limits.*

Pathway Interruption - During construction, isolate areas of work to prevent contamination of clean or occupied spaces. Depending on the climate, ventilate using 100% outside air to exhaust contaminated air directly to the outside during installation of VOC-emitting materials. Pressure differentials between construction areas and clean areas can be utilized to prevent contaminated air from entering clean areas. Such strategies require the erection of temporary barriers between work areas and non-work areas. Require VOC-safe masks for workers installing VOC-emitting products (interior and exterior) defined as products that emit 150 gpl or more UNLESS local jurisdiction's requirements are stricter, in which case the strictest requirement shall be followed for use of VOC-safe masks.

Protect Absorptive Materials - Protect stored on-site or installed absorptive materials from moisture damage. Identify as many of these materials before construction begins and include in the consideration of IAQ Construction Plan.

Housekeeping - Institute cleaning activities concentrating on HVAC and building spaces to remove contaminants from the building prior to occupancy. Building materials will be protected from weather and stored in a clean area prior to unpacking for installation. All coils, air filters, and fans will be cleaned before performing testing and balancing procedures and especially before conducting baseline air quality tests. Use low-toxic cleaning supplies for surfaces, equipment, and worker's personal use. Options include several soybean-based solvents and cleaning options (SoySolv) and citrus-based cleaners.

Scheduling - Specify construction sequencing to reduce absorption of VOCs by porous materials. Complete applications of wet and odorous materials such as paints, sealants, and coatings before installing absorbent "sink" materials such as ceiling tiles, carpets, insulation, gypsum products, and fabric-covered furnishings. Materials directly exposed to moisture through precipitation, plumbing leaks, or condensation from the HVAC system are susceptible to microbial contamination and will be replaced.

DMGBR Compliance

To assure DMGBR requirements of Indoor Environmental Quality credits 401.02 & 401.06 are met, the following must be completed and submitted to the concerned U.A.E. Authority that is in charge of implementing GREEN BUILDING Regulations.

Signed DMGBR letter template on official company letterhead declaring the IAQ plan was developed and implemented
AND
During construction:

- Meet or exceed the recommended control measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) Indoor Air Quality (IAQ) Guidelines for Occupied Buildings Under Construction, 1995, Chapter 3.
- Protect stored on-site or installed absorptive materials from moisture damage.
- If permanently installed air handlers are used during construction, filtration media with a MERV of 8 will be used at each return air grille as determined by ASHRAE 52.2-1999. Replace all filtration media prior to occupancy.

The buildings which optionally apply the following procedures will be awarded indoor air quality certificate by Dubai municipality.
A. Indoor air quality testing must be carried out prior to occupancy. The maximum limit for indoor air contaminants included in Table 401.6(1) must not be exceeded. A report which shows compliance with these requirements must be submitted to Dubai Municipality.

Table 401.6(1) - Schedule, Duration of Sampling, and Maximum Limit for Contaminants

Sampling Schedule	Type of Samples	Maximum Acceptable	Sampling Duration
Pre-Occupancy	Formaldehyde	< 0.08 parts per million (ppm)	8- hour continuous monitoring (8 hour time-weighted average [TWA])
	Total Volatile Organic Compound (TVOC)	< 300 micrograms/m³	
	Suspended Particulates (<10 microns)	< 150 micrograms/m³	

B. Air Quality testing must be carried out by an air testing company or laboratory accredited by Dubai Municipality (DM), and the Compliant test results must be submitted to DM.
C. Air quality testing equipment must have initial and periodical calibration certificate as per manufacturer requirement from an external calibration facility accredited by DM or at least annual calibration certificate. The initial and periodical calibration
certificates must be saved in a special register to be checked by DM in order to ensure the accuracy of the readings as condition of renewal the indoor air quality certificate.

APPENDIX A

DMGBR: Low-Emitting Materials

Adhesives, Sealants, and Sealant Primers: South Coast Air Quality Management District (SCAQMD) Rule #1168.

Table 1: SCAQMD VOC Limits

Architectural Applications	**VOC Limit [g/L less water]**	**Specialty Applications**	**VOC limit [g/L less water]**
Indoor Carpet Adhesives	50	PVC Welding	510
Carpet Pad Adhesives	50	CPVC Welding	490
Wood Flooring Adhesives	100	ABS Welding	325
Rubber Floor Adhesives	60	Plastic Cement Welding	250
Subfloor Adhesives	50	Adhesive Primer (plastic)	550
Ceramic tile adhesives	65	Contact Adhesive	80
VCT & Asphalt Adhesives	50	Special Purpose Contact Adhesive	250
Drywall & Panel Adhesives	50	Structural Wood Member Adhesive	140
Cove Base Adhesives	50	Sheet Applied Rubber Lining Operations	850
Multipurpose Construction Adhesives	70	Top & Trim Adhesives	250
Structural Glazing Adhesives	100		
Substrate Specific Applications	**VOC Limit [g/L less water]**	**Sealants**	**VOC Limit [g/L less water]**
Metal to Metal	30	Architectural	250
Plastic Foams	50	Nonmembrane Roof	300
Porous Material (except wood)	50	Roadway	250
Wood	30	Single-Ply Roof Membrane	450
Fiberglass	80	Other	420
		Sealant Primers	**VOC Limit [g/L less water]**
		Architectural Non Porous	250
		Architectural Porous	775
		Other	750

Aerosol Adhesives: Green Seal Standard for Commercial Adhesives, GS-36 requirements

Table 2: Green Seal VOC Limits

Aerosol Adhesives	**VOC Weight [g/L minus water]**
General purpose mist spray	65% VOCs by weight
General purpose web spray	55% VOCs by weight
General purpose aerosol adhesives (all types)	70% VOCs by weight

APPENDIX A

Paints & Coatings: Green Seal Standard, GS-11 for Paints and GC-03 for Anti-Corrosive Paints requirements

Table 3: Paints, Coatings, and Primers: Greenseal VOC limits

Paints & Coatings	**VOC Limit [g/L less water]**
Flats	50 g/L
Non-flats	150 g/L
Anti-corrosive and anti-rust paints	250 g/L

Clear wood finishes, floor coatings, stains, sealers, and shellacs: South Coast Air Quality Management District (SCAQMD) Rule #1113.

Table 4: SCAQMD VOC Limits

Clear Wood Finishes	**VOC Limit [g/L less water]**
Varnish	350 g/L
Lacquer	550 g/L
Floor coatings	100 g/L
Sealers	
Waterproofing sealers	250 g/L
Sanding sealers	275 g/L
All other sealers	200 g/L
Stains	250 g/L

Carpet Systems:
All carpet systems and carpet cushions installed in the building will meet the testing and product requirements of the Carpet and Rug Institute's (CRI) Green Label Program. *Refer to section 9 of Standard Practice for the Testing of Volatile Organic Emissions from Various Sources.*

Composite Wood and Agrifiber Products:
Composite wood and agrifiber products used in the interior of the building will contain no added urea-formaldehyde resins.

Composite wood and agrifiber products are defined as: particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates, and door cores.

End of Annexure 2.

Legionella Management Plan

Emaar South- Park Side- 2 (Plot GC04),
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Emaar South- Park Side- 2(Plot GC04)

Dubai, UAE

Audit Sheet

Intended for:				Submitted By:		
Project Owner/Representative Project Team & Facility Manager				Sustainability Division, Khatib & Alami		
Rev.	Date	Prepared by		Approved by		Revision Notes
		Name	Sign	Name	Sign	
00	21-04-2019	Mohammed Pasha	MKP	Waseem Al Azeh	WA	Design Phase

Contents

1. Introduction

The purpose of the Legionella Management Plan (LMP) is to minimize the risk of transmissions of Legionellosis from the built environment to susceptible hosts. The Legionella Management Plan clearly details the water based equipment maintenance requirements and responsibilities of the operator/manager who is responsible for management & control of Legionella bacteria within compound buildings.

This document sets out a framework for ensuring water systems are installed, operated, and maintained in a manner which both reduce the risk of a Legionella outbreak and ensures an appropriate water quality.

The goals of the Legionella Management Plan are to ensure that:

- All water based systems for the facility comply with legislation in respect to installation, commissioning, operation, and maintenance.
- Building owners and occupiers are aware of their responsibilities and understand the Code of Practice for the Control of Legionnaires' Disease.
- All water based systems are audited and inspected consistent with any health risk management approach adopted in the Legionella Management Plan.

This is a design phase Legionella Management Plan and required to be updated by the Construction stage project team / Facility Manager upon completion of construction of the building. Overall responsibility for Legionella Management of the building lies with the building Owner and Operator.

1.1 Scope

This document will assist the following persons to ensure compliance with the regulatory requirements in order to minimize the potential for outbreaks of Legionnaires' disease:

a. Developers
b. Architects
c. Building owners and managers
d. Government agencies

The design phase Legionella Management Plan has been prepared in accordance with the general principles of the ACOP L8 (Approved Code of Practice & Guidance).

1.2 Reference Documents

- Legionnaires' Disease – The Control of Legionella Bacteria in Water Systems, Approved Code of Practice and Guidance on Regulations (ACOP-L8)

1.3 Legislation and Guidelines

- Legionella management plan is prepared to address the requirements of DMGBR credit no. 406.01 & 406.02 Legionella Bacteria and Building Water Systems for all relevant water based systems.
- The most relevant guideline to the preparation of the LMP is the UK HSE Approved Code of Practice ACOP L8 – "The control of Legionella bacteria in water systems".

2. Risk Prevention and Control

The risk assessment for the project shows that there is a reasonable foreseeable risk in the domestic water system and this cannot be totally eliminated, hence a written scheme for controlling the risk of exposure is prepared. This scheme specifies measures to be taken to ensure that it remains effective and include:

a. An up-to-date plan showing the layout of the plant or system, including any part temporarily out of use;
b. A description of the correct and safe operation of the system;
c. The precautions to be taken;
d. Checks to be carried out to ensure efficacy of the scheme and the frequency of such checks;
e. Remedial action to be taken in the event that the scheme is shown not to be effective

There are many ways in which exposure to Legionella bacteria can be controlled and the complexity of the controls will vary depending on the risks posed by any one system. The risk from exposure will normally be controlled by measures, which do not allow the proliferation of Legionella bacteria in the system and reduce exposure to water droplets and aerosol. Control measures include the following precautions where appropriate:

a. Avoiding water stagnation, which may encourage the growth of bio film;

b. Avoiding the possibility of materials which provide a harbor for nutrients which encourages the multiplication of bacteria, e.g. dead animals, wood etc., which can fall into open water tanks;
c. Keeping systems clean to avoid the build-up of sediments which may harbor bacteria
d. The use of suitable and safe water treatment programs;
e. Effective monitoring and management systems, which ensure correct and safe operation together with effective maintenance of the water system.

The primary objective is to avoid conditions, which permit Legionella Bacteria to proliferate and to avoid creating a spray or aerosol.

2.1 System Description

The following is a record of the designed system, and copies of the current drawings area provided in submission folder.

The description and the drawing will need to be updated upon completion of the construction to reflect any changes made during construction.

The description of the system should be reviewed by the building owner throughout the life of the building as described in the L8 ACOP and changes to the written description or record drawings made as required.

This description should be read in conjunction with the design drawings provided and the design risk assessment included in the Appendix-1

Air conditioning system

The primary source of air conditioning is through direct cooling (refrigerant-based) AC Units (Dx). The proposed air conditioning system has FAHU/AHU & indoor & out door AC units (split AC) to deliver cold air into conditioned spaces. Low to medium risk arises if a system leak is present and in the form of water, droplets at condensate drain pan. Overall assessment of the air conditioning system is at low risk.

Cold Water systems

The cold water system supplied from the Dubai municipality (DEWA) network. The domestic water temperature will vary according to DEWA water supply temperature and ambient conditions. The domestic water storage tank is well insulated and protected from direct sun light. Despite these measures, domestic water is likely being stored at a temperature above 20 degrees Celsius for much of the year, which increases the risk of Legionella.

Domestic water is utilized for the following uses:

- Toilets
- Wash basins
- Showers
- Bidets/bidet sprays
- Hose bibs
- Swimming pool

In particular, showers and swimming pool water use present potential exposure of building occupants to Legionella. However, none of the above uses provides water in aerosol form. Hence, the risk of infection is likely to be low. However, showerheads do present a potential site for Legionella growth if not maintained properly.

Water outlets that are low use located downstream of high use outlets present a potential risk of Legionella growth through water stagnation. At the design stage, no-outlets are for low use. However, based on the occupancy schedule of the building, low used outlets may be identified and this should be considered in subsequent risk assessments.

As the building is a new construction (design phase) there is not expected to be any "dead leg" piping installed. Dead leg piping is typically a section of piping where a pervious appliance or water use has since been removed which may lead to water stagnation.

As the water within the domestic water system will be stored at temperatures between 20 degrees Celsius and 40 degrees Celsius and municipal water supplies can potentially contain very low traces of Legionella bacteria the domestic water supply systems present a low residual Legionella risk, which will require appropriate management.

Below mentioned points are noted for the building water system design concerned with Legionella prevention.

- Water storage tanks are provided with backflow protection to the main supply.
- The main storage tank is seated in a cool place and protected from extremes of temperature.
- Cold water pipes are kept away from hot ducting and other hot piping to prevent excessive temperature rises in the cold water supply.
- Non return valve (NRV) incorporated in the design for main water supply from DEWA.

- Drainage valve considered for water storage tank design to allow complete draining of the tank when cleaning work is required.

Hot Water System

The hot water consists of localized solar hot water system (for town houses) electric heater (for community center) installed in toilet areas. Hot water is fed from the domestic water supply. Whilst in operation solar hot water system & electric water heaters will maintain an operating temperature above 40DegC, which is sufficient to kill the Legionella Bacterium.

Solar hot water system and electric hot water tanks are supplied from the filtered domestic water supply that should prevent the introduction of any Legionella to the system. Furthermore, hot water tanks (for solar hot water system and electric heaters) are sealed, which should help prevent any pockets of oxygen in the system, which is vital for Legionella and Bio-film growth. Additionally the lack of any daylight further inhibits Bio-film growth, hence reducing Legionella risk.

Hot water is delivered directly to water outlets. This again minimizes the risk of Legionella in the hot water system as reduces the potential for hot water to be stagnant below 40 degrees Celsius.

The Legionella risk of the solar hot water system and electric hot water system is therefore considered at low risk. The installed systems should be risk assessed, however, post construction and any necessary actions for management identified in the post construction LMP.

Swimming Pool and Water Features

A shared swimming pool is present in the facility (community center). Water is passed from the water storage tank through a filtration system prior to entering the swimming pool. Chemical disinfection is used for swimming pool water to prevent the buildup of organic matter. These measures effectively eliminate the risk of Legionella growth within the swimming pool system. However, a small risk exists from failures during operation that causes filtration and chlorination of the pool to cease.

Owner installed systems

The building owner may install other equipment that includes water or other liquids that might be at risk of Legionella colonies developing. Such equipment may include water coolers, appliances, and other equipment. The building owner and their specialist

consultant will need to carry out risk assessments of the equipment provided at the end of construction and this will need to be monitored on an ongoing basis for changes throughout the life of the building by the building owner.

2.2 Monitoring and routine inspection

Where there is a significant risk there is a need to ensure that the control measures remain effective. This should be the duty of the responsible person or, where appropriate, an external contractor and should involve:

a. Checking the performance of the system and its component parts:
b. Inspecting the accessible parts of the system for damage and signs of contamination; and
c. Monitoring to ensure that the treatment regime continues to control to the required standard

The frequency and extent of the routine monitoring will depend on the operating characteristics of the system.

3. Written Scheme

The written scheme for controlling the risk of exposure to Legionella bacteria is developed for hot and cold water system using the results of the Legionella risk assessment, and defines the required tasks and their frequency.

3.1 Cold water services

Weekly

Flush through little-used outlets and purge them to drain, or purge to drain immediately before use, without releasing aerosols. Remove little-used outlets if possible.

Monthly

Inspect the incoming mains water at the ball valve outlet to the cold-water storage tank. Inspect all water filtration systems. Inspect the water storage tank for visible contamination. If the water tank is contaminated, drain the water and clean the tank.

Annually

Inspect all cold-water storage tanks and carry out remedial works where necessary.

3.2 Hot water services

Weekly

Flush through little-used outlets and purge them to drain, or purge to drain immediately before use, without releasing aerosols. Remove little-used outlets if possible.

Monthly

Check that the water temperature is at least 50 Deg C after running the water for 1 minute at sentinel taps.

Check on a sentinel basis, that the water supply to thermostatic mixing valves (if fitted) is at least 50 Deg C within 1 minute of running the water.

3.3 Swimming Pool

a. Apply an adequate chemical treatment system, ensure chemical parameters are maintained within recommended limits and dosage adjusted according to the number of people using the pool.
b. Test the pool prior to and after use and monitor chemical parameters regularly (at 2 hourly intervals where dosing is controlled manually).
c. Carry out bacteriological sampling at least quarterly (more often if problems are identified).
d. Consider closing the pool if chemical or bacteriological parameters exceed recommendations and the water could be a health risk to bathers. Seek advice from your EH Department. Resample until normal parameters are achieved.
e. Implement a procedure to deal with faecal contamination of the water, e.g. clearing the affected pool area, remove as much material as possible, consider back washing the filters if necessary and monitor parameters closely.
f. Ensure all equipment is regularly serviced and maintained.
g. Ensure filters, are adequately cleaned and maintained.
h. Check equipment regularly for problems that could affect water treatment e.g. air locks in the automatic dosing system.
i. Make sure that an adequate number of staff are trained in the operation of plant and equipment and water treatment.
j. Put in place an emergency callout procedure with a competent water treatment/pool engineering company, or alternatively adequately train staff to deal with emergencies in-house

k. Ensure there is a competent person on site at all times who can deal with any potential problems regarding water quality, plant and equipment or other emergencies that may arise.
l. Implement a procedure to regularly check, clean and disinfect the balance tanks for the swimming pool.

3.4 Remedial actions to be taken

The temperature at blended outlets should be nominally 43Deg C, but specifically in the range 39DegC for bidets, 41-43Deg C for wash basins. Record discrepancies, call in maintenance contractor and request an adjustment or replacement.

Electric water heater should be clean internally and free from sludge or heavy scaling. Record discrepancies and report to facility manager or water management officer.

Report any discrepancies between the schematic drawing and the physical arrangement of water services found on site to facility manager.

The temperature at sentinel taps should be within range as stated in the below table. Record discrepancies and report to facility manager.

3.5 Checks to be carried out to ensure efficacy of the scheme

Frequency	Action	Responsibility
Weekly	Flush-little-used outlets to drain without release of aerosols.	Occupier/Facility management
Weekly	Check and record blended water temperature from thermostatic mixing valves were fitted. Confirm that stable temperature is attained within a minute.	Occupier/Facility management
Monthly	Check water temperature at sentinel taps. Hot water>50 Deg C after 1 minute, cold water temperature <20 Deg C after 2 minutes.	Occupier/Facility management
Monthly	Regular flushing of showers and taps	Occupier/Facility management

Monthly	Check solar hot water & electric water heater temperatures. Flow 60-65 Deg C, return >50 Deg C.	Facility management
Quarterly or as necessary	Dismantle clean and descale shower heads and hoses.	Facility management
Every six months	Measure incoming water temperature to cold water cisterns.	Maintenance contractor
Every six months	Measure cold water temperature increase between incoming main and most distant outlet. Should be less than 3 Deg C.	Maintenance contractor
Annually	Take sample and record condition of water from HWS solar hot water system & Electric water heaters	Maintenance contractor
Annually	Open and inspect the internal surfaces of solar/electric hot water heater for scale and sludge and clean or descale as necessary.	Maintenance contractor
Annually	Check and record the temperature at a representative number of taps throughout the system on a rotational basis	Maintenance contractor
Annually	Inspect cold water cisterns and carry out remedial work as necessary. Record work done and report outstanding defects.	Maintenance contractor
Annually	Physically inspect the hot and cold water systems & check the accuracy of schematic As-built drawings. Record the changes & inspect for under used fittings & suggest recommendations.	Service provider or specialist contractor

4. Cleaning and Disinfection

Cleaning and disinfection of hot and cold-water services should be undertaken under the following circumstances:

a. Routine inspections indicate that an unacceptable level of system fouling is present.
b. The results of microbiological analysis show that bacterial numbers are higher than the specified level
c. The building/facility has undergone a change of use.
d. The water systems have been modified.
e. There has been an outbreak of Legionellosis.

4.1 Disinfection procedure

If required, disinfection can be carried out using either chlorination or thermal disinfection procedures.

Chlorination

Disinfection can be carried out by chlorination in accordance with the procedure described in BS6700

A free chlorine concentration of 50ppm for 1 hour, or 25ppm for 2 hours should be achieved throughout the system.

Thermal Disinfection

Disinfection can be carried out by thermal disinfection. The temperature of the whole of the content of the heater/Electric water heater should be raised to about 70Deg C. This water is then circulated/drain through the distribution system for at least 1 hour.

To be effective, the temperature of the Electric water heater should be high enough to ensure that the temperature at all outlets does not fall below 60 Dec C.

5. Record keeping

It is essential that effective records keeping procedures are implemented, managed and maintained.

a. The site logbook should contain comprehensive records of the monitoring and maintenance tasks laid out in the writing scheme.

b. The logbook should include system description & schematics, operating procedures, risk assessment, precautionary measures, treatment program and any additional considerations.
c. System description and schematics: A description and schematic of the entire system, including all items of plant
d. Operational procedures: Procedures detailing the safe operation of the system/plant, including safe start-up and shutdown procedures. Specific responsibilities of site personnel and contractors. Routine alternation of standby equipment.
e. Risk assessment: A full detail of the Legionella risk assessment has been prepared for the project. Refer risk assessment report.
f. Precautionary measures: This information detailed in the written scheme section-4 of this document.
g. Data record: Results of monitoring, inspections, tests and checks, including; a record of all results, duly signed and dated by the persons carrying them out. A record of analysis. An asset inspection record, including any remedial actions taken. A record of cleaning and disinfection, including details of disinfectant concentration, temperature (during pasteurization) and certification. Personnel training records.
h. Treatment program: Full details of all water treatment programs, including control criteria, deviations and non-conformances. For each non-conformance a record should be of:
    - Specific details of the incident.
    - Reasons for the non-conforming.
    - The recommended actions to rectify the problem.
    - The actions that were actually carried out.
    - Details of the person rectifying the non-conformance.
    - Confirmation that the problem has been corrected properly and signed off by the person responsible, and that the system is under effective control once again.
    - All tasks should be recorded, signed for and dated by the person carrying them out.
    - The logbook should be audited regularly by the site's responsible person.

5.1 Electronic Data Management

Electronic data management systems, including software-based logbooks can also be used as a tool in the control and management of Legionella risks. This is driven by the

increasing complexity of building services installations, legislative compliance requirements and the availability of cost effective data management systems.

This system offers significant advantages, particularly in the management of more complex systems and larger property portfolios, where they allow managers to take a more holistic approach to the control of complex Legionella related risks.

6. Training & Responsible Persons

6.1 Training

Training of staff is required for the operational success of minimizing the risk of a Legionella outbreak. Staff must be instructed of their responsibilities, be given adequate information about the risks of Legionella and what precautions need to be taken to avoid them and what the dangers and consequences of not maintaining water systems will be.

The management will be responsible for identifying the training needs of the staff for which he is responsible. Records of any training must clearly show the level and content of the training provided and must be recorded in the Site Log Book.

6.2 Responsible persons

Lines of communication and program management responsibilities are identified and recorded.

Management

The building management has overall responsibility for all aspects of Legionella control of the site and day to day operational responsibilities. The Director of the building management team will be the principal nominated responsible person and will ensure the requirements of the ACOP (Approved Code of Practice), other associated legislation and supporting guidance are implemented.

Operations

The facility operations will be responsible for ensuring the operational requirements of the ACOP, other associated legislation and supporting guidance are implemented. The facility operations will be supported in these duties by the facility engineer.

The facility engineer will be responsible for overseeing the day to day operational requirements of the ACOP, other associated legislation and supporting guidance. This will include:

a. Coordinate external contractors and trade staff in the undertaking of maintenance works, inspections, monitoring & record keeping
b. Respond to any problems highlighted.

7. Legionella Outbreak Responses

An outbreak of Legionnaires' disease is an event whereby:

- Two or more probable notifications are linked in time and place, and
- They have a history consistent with Legionnaires' disease.

As part of the outbreak investigation and control, the enforcing authority may make the following requests and recommendations.

- To shut down any processes that are capable of generating and disseminating airborne water droplets and keep it shut down until sampling procedures and any remedial cleaning or other work has been done. Final clearance to restart the system may be required.
- To take water samples from the system before any emergency disinfection being undertaken. This will help the investigation of the cause of the illness. The investigating officers from the operator side may take samples or require them to be taken.
- To provide staff health records to discern whether there are any further un-diagnosed cases of illness and to help prepare case histories of the people affected.
- To cooperate fully in an investigation of any plant that may be suspected of being involved in the cause of the outbreak. This may involve, for example:
    i. Tracing of all pipe work runs;
    ii. Detailed scrutiny of all operational records;
    iii. Statements from plant operatives and managers;
- Statements from water treatment contractors or consultants
- If a water system other than a cooling system is implicated in an outbreak of Legionnaires' disease, emergency treatment of that system should be carried out as soon as possible.

Appendix-1 Legionella Risk Assessment Report

Legionella Risk Assessment

Component	Water supply	Temperature ranges 25degC to 45degC?	Stagnant water presence?	Contamination presence? (Contamination provides the possible growth of organic matter that is required for Legionella growth)		Oxygen presence? (Required for Legionella growth)	Sun light presence?	Water outlet delivers water in droplet form of size 0.005mm?	Legionella bacteria growth risk	Risk mitigation measures in the design	Residual risk
				Iron (rust)	Organic matter						
Air conditioning system	AC Unit (Dx Refrigerant based) – FAHU/AHU	<18Deg C	Yes (Condensate drain pan)	No	Yes (through contamination at condensate drain pan)	Yes	No	No	Plausible	Cleaning and preventing clogging of condensate drain pan	Low risk
Cold water storage	Municipal supply	Yes	Yes	Yes – potentially through contamination	Plausible through contamination	Yes	No	No	Plausible	Filtration Tank material inhibits growth of bacteria	Low risk
Cold water supply system	Municipal supply	Yes	Yes (standby pumps, low use outlets, dead legs)	Yes – potential through rust of pipes and fixtures	Plausible through contamination	Yes	No	No (showers in the apartment produces water droplets>5micron)	Plausible	Filtration. Pipes are plastic which are not susceptible to corrosion	Low risk
Solar hot water (TH) & Electric hot water heater	Municipal supply	Yes (when heater is turned 'off')	Yes	Yes	Plausible through contamination	Yes	No	No	Plausible	Water tank interior is nonferrous metal to mitigate corrosion	Low risk
Hot water supply	Municipal supply	Yes – when the water heater is turned 'off'	Yes	Yes – potential through rust of pipes and fixtures	Plausible through contamination	Yes	No	Yes – steam from showers	Plausible	Filtration of cold water supply Pipe material	Low risk
Fire hydrant Community Center	Municipal supply	Yes	Yes	Plausible	Plausible through cold water supply	None – system pressurized and bled	No	No	Negligible	None	Negligible
Swimming pool & Showers	Municipal supply	Yes	Yes (water is recirculated through filters)	No	Yes	Yes	Yes	No	Plausible	Cleaning & regular maintenance of the shower head	Medium Risk

Legionella Risk Assessment Summary

Water is provided to the building via a municipal network. Water sources present a low risk of Legionella presence. Whilst water will be present at the temperature range where Legionella growth is possible and stagnant water will exist within systems, if operated as designed the presence of organic matter (rust and other organic matter), which is a required food source for Legionella, should be eliminated.

Furthermore, there are negligible instances where water droplets occur in a size of 0.005mm, which is the droplet size, required for penetration deep into the lungs and consequent Legionella infection. Pipe and storage tank materials have been selected to have low corrosion properties. These design measures mitigate most of the risk associated with Legionella within this building.

During the construction and operation phase, the following measures should be carried out to prevent escalation of the Legionella risk:

- Avoid water stagnation where possible. Avoid the introduction of dead legs.
- Prevent the introduction of rust and organic matter into the water system (ensure integrity of storage tank lids).
- Clean shower heads weekly once.
- Regular cleaning/disinfection of storage tanks and water systems.
- Ensure no leaks in water systems which may present puddles that pose a Legionella risk.
- Regularly update the Legionella risk assessment and Legionella Management Plan.
- Apply an adequate chemical treatment system, ensure chemical parameters are maintained within recommended limits and dosage adjusted according to the number of people using the pool.
- Test the swimming pool prior to and after use and monitor chemical parameters regularly (at 2 hourly intervals where dosing is controlled manually).
- Ensure water based equipment are regularly serviced and cleaned.

Appendix-2

RESPONSIBLE PERSONS - MANAGEMENT

Overall Responsibility: Nominated Technical Responsibility

Name: ***To be updated***

Position: ***To be updated***

Delegated Operational Responsibility and co-ordination of all Staff to ensure operational procedures are undertaken:

Name:
Position:

General Health and Safety advice:
Name:
Position:

Appendix-3

RESPONSIBLE PERSONS - OPERATIONS

Operational Responsibility

Name: *To be updated*
Position: *To be updated*

Responsibilities:
To ensure that:

1. The facility has a Legionella Management Plan and that it is fully implemented
2. The operational requirements of ACOP are implemented
3. Any risks identified in the Risk Assessment are acted upon and ensure that each premises of the facility has maintenance responsibility and has a risk assessment
4. Staff have enough time and resources to undertake their duties in respect of Legionella and that they are adequately trained to carry out their duties
5. Ensure that the necessary requirements for the safe management of water systems are identified and fully incorporated into any design or specification that Projects Team have responsibility for
6. An annual review/audit is undertaken

Appendix-4

Co-ordination of Operational Duties and Monitoring of Systems

Name: *To be updated*
Position: *To be updated*

Responsibilities:
To ensure that:

1. Maintenance tasks, as generally outlined in the Operational manual, are undertaken on a planned basis.
2. Ensure an emergency procedure for suspected contamination by Legionella Bacteria is developed and implemented.
3. Emergency breakdown maintenance work is undertaken promptly and that any special precautions.
4. The quality of workmanship is acceptable.
5. Maintenance contractors employed to undertake any Legionella related maintenance activities are competent to do so and that they are fully briefed with a written specification/schedule of work before they commence work on site.
6. All maintenance work is undertaken in accordance with Health & Safety requirements, guidance, law, etc.
7. Records are filled in on a regular basis, in accordance with the Operational manual.
8. Records are scrutinized as they are presented, with any deficiencies being acted upon.
9. Records are kept in the appropriate log books.
10. A quarterly report is produced, outlining what work has been completed.
11. Superiors are, notified of any potential risk.